JOINT CALFED/SJRMP SAN JOAQUIN RIVER FISHERY TECHNICAL TEAM MEETING REPORT

Prepared for:

CALFED Ecosystem Roundtable
and
San Joaquin River Management Program

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1. INTRODUCTION

The CALFED Bay-Delta Program was established in May 1995 as a cooperative effort among seven state and federal agencies with management and regulatory responsibilities in the Bay-Delta. The program is aimed at developing a long-term solution to problems affecting the San Francisco Bay/Sacramento-San Joaquin Delta estuary in Northern California, with a focus on ecosystem quality, water quality, water supply reliability, and system vulnerability. As part of CALFED, the Ecosystem Roundtable was formed as a stakeholder group to provide guidance regarding implementation of ecosystem restoration projects in the next three-to-five years. CALFED and the Ecosystem Roundtable are soliciting input from technical experts in a variety of disciplines and geographical areas to aid in identifying and prioritizing restoration projects.

The San Joaquin River Management Program (SJRMP) was established through legislation to identify actions which can be taken regarding the San Joaquin River to benefit all legitimate uses of the system. The program objective is to develop comprehensive and compatible solutions to water supply, water quality, flood protection, fisheries, wildlife habitat and recreation needs.

1.1 Workshop Objectives

On January 15 and 16, 1997, the CALFED Bay-Delta Program and SJRMP jointly conducted a workshop at Bass Lake Resort, east of Merced. The workshop objectives were to:

- Review historical habitat and salmon population conditions in the San Joaquin River

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system.

- Review existing studies, projects, and management plans, including goals and objectives for restoration.

- Identify and prioritize problem areas and limiting factors.

- Identify potential solutions for limiting factors.

- Develop a package of prioritized fishery restoration projects to be implemented over the next three-to-five years.

- Provide the package of restoration projects to CALFED and the Ecosystem Roundtable for inclusion in the five-year workplan being developed to guide funding decisions during the next funding cycle.

1.2 Workshop Approach

A copy of the workshop agenda and attendee list is provided in Appendix A. The workshop consisted of selected background presentations, general session discussions, and geographic subgroup discussions. The background presentations included a review of the history of human intervention in the San Joaquin basin by Jennifer Vick (Appendix B), and a presentation on the

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status of San Joaquin fall run chinook salmon escapements by Bill Loudermilk (Appendix C). General session discussions included comments from David Bernard on ecosystem restoration (Appendix D), and information from Paula Landis on SJRMP studies, projects, and funding sources (Appendix E).

Partway through the workshop, the participants were divided into two subgroups that addressed: 1) the Stanislaus River and San Joaquin River (SJR) downstream of the Stanislaus River confluence, and 2) the Tuolumne and Merced rivers, and San Joaquin River upstream of the Stanislaus River confluence, for purposes of discussing system stressors and potential restoration projects in different portions of the SJR watershed. The entire group then reconvened to discuss their subgroup results, combine their findings, and jointly prioritize various types of restoration actions and/or specific projects.

1.3 General Session Comments

The first general session began with a review of workshop goals and objectives, and associated discussion. It was noted that the technical results of the workshop have multiple clients, including SJRMP, CALFED, and the Central Valley Project Improvement Act (CVPIA) program. The focus of the workshop was on aquatic resources, particularly anadromous fish (fall run chinook salmon), because of their connection to the Delta and associated CALFED concerns.

Following the presentations by Jennifer Vick, Bill Loudermilk, and Paula Landis, Cindy Darling

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reviewed the status of CALFED funding. The Category III component of Proposition 204 ($60 million) and stakeholder contributions to Category III are the first component of the current restoration funds. In addition, there are the CVPIA Restoration Fund and state CVPIA matching funds, and potential federal matching funds to Proposition 204 monies. The variety of potential funding sources was emphasized, and Cindy concluded by noting that the technical teams are being asked to identify the actions that need to be taken and that there are many different funding sources that could be available to address those actions.

The afternoon session began with a discussion of targets for production of fall run chinook (see Section 2). David Bernard reviewed the process for considering restoration actions, identifying indicators, and setting boundaries for space and time constraints (see Appendix D). Subsequent discussion led to concurrence that the space boundary for the workshop would be the San Joaquin River system as far downstream as the head of Old River. The Delta area technical team will address restoration projects on the San Joaquin River downstream of that point. Although the entire San Joaquin River was discussed, the primary focus would be on the section downstream of the Merced River confluence. The time period focus would be projects and programs over the next 3-to-5 years.

The rest of the afternoon and following day were spent in the breakout subgroups and/or in a combined general session that addressed stressors in the fall run chinook salmon life cycle, potential projects and programs that would address these stressors, and priorities for restoration.

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2. RESTORATION GOALS

Broad goals for ecosystem restoration in the San Joaquin basin include re-establishment of biological and physical functions, population recovery for key species, and maintenance of beneficial uses of the chinook salmon fishery resources. Specific numerical restoration goals for chinook salmon in the San Joaquin River system were compiled from the CVPIA draft Anadromous Fish Restoration Program (AFRP), and the Delta Native Fishes Recovery Plan. These goals are as follows.

Anadromous Fish Restoration Program

The goal of the AFRP, as cited in Title 34, is to sustain natural production "*...at levels not less than twice the average levels attained during the period of 1967-1991...*" Production targets for the AFRP are arithmetic means that represent a combination of escapement and harvest. Targets for each of the San Joaquin tributaries are:

Stanislaus River	≥22,000
Tuolumne River	≥38,000
Merced River	≥18,000
Total	≥78,000

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Assuming a 75% harvest rate in the ocean, these production targets translate to an escapement of approximately 20,000 fish returning to spawn in the San Joaquin system. Current escapement is approximately 4,000 fish, so this production target represents a five-fold increase. Escapement records presented by Bill Loudermilk earlier in the workshop (Appendix C) show that this target is within historical levels.

Delta Native Fishes Recovery Plan

The Delta Native Fishes Recovery Plan goal is for naturally spawned fish, and includes criteria for average and minimum escapement over a 15-year period. The criteria are:

1. Median escapement of 20,000 fall run chinook over 15 years, with at least 3 years classified as dry or critically dry, and

2. A 3-year running average, over 15 years, of greater than or equal to 3,000 fish with at least 3 years classified as dry or critically dry.

3. Smolt survival numbers must approach pre-project levels when adult numbers decline to less than 3,000 naturally spawning fish.

It should be noted that goals from each of these sources are roughly equivalent. Although the

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five-fold increase was considered feasible by the workshop attendees, the mechanism for acheiving the goal was not certain. There was some concern that a numeric fish population goal is not sufficiently representative of ecosystem process, although it may be a good indicator. There is a risk, however, that there may be too much "noise" in the population fluctuations to use them as an indicator of healthy ecosystem process and function.

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3. ECOLOGICAL STRESSORS

3.1 Fall Run Salmon Life Cycle

Each of the two subgroups developed schematics displaying the interrelationship of various stressors on different portions of the fall run chinook salmon life cycle within their respective geographic areas. The subgroups divided the life cycle slightly differently and used somewhat different names to identify stressors.

The subgroup for the Tuolumne, Merced, and upper San Joaquin rivers developed three schematic diagrams that displayed stressors and their interrelationships that affect spawning success and adult mortality (Figure 1), egg mortality (Figure 2), and fry to smolt growth or mortality (Figure 3). The diagrams were then used to tabulate individual stressors, which were subsequently lumped into major stressor categories.

The subgroup for the Stanislaus River and the lower San Joaquin River developed four schematic diagrams that displayed stressors on the spawning habitat (Figure 4), fry and juveniles to yearling age (Figure 5), migrating smolts (Figure 6), and smolts and adults from smolt outmigration to adult spawning (Figure 7). They then identified the stressors considered most important for each life stage from the diagrams. The high priority stressors for all life stages were then considered together and voted on to indicate overall priority. Stressors outside the geographic boundary of the workshop were noted to be considered in another forum.

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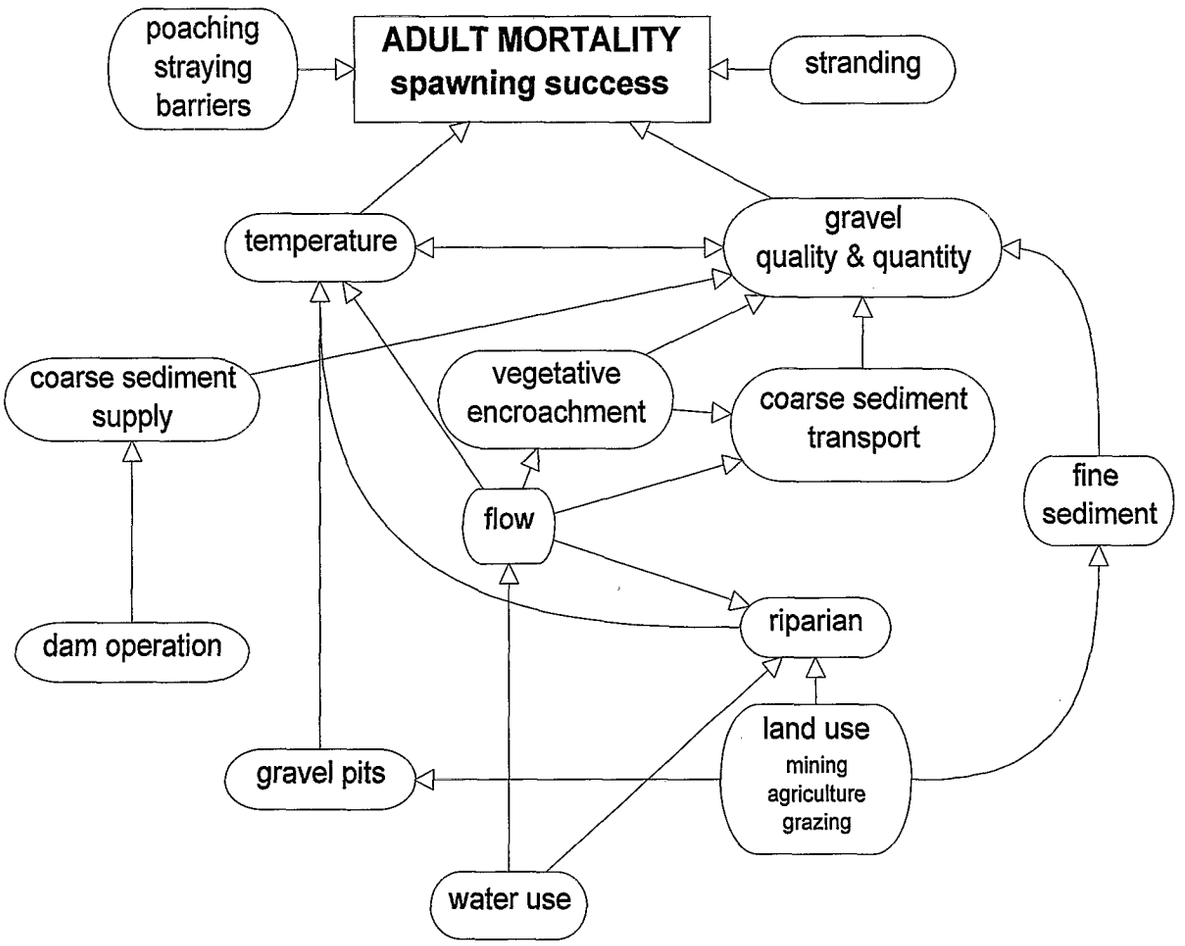

Figure 1. Stressor chart for adult fall run chinook salmon in the Tuolumne, Merced, and upper San Joaquin rivers.

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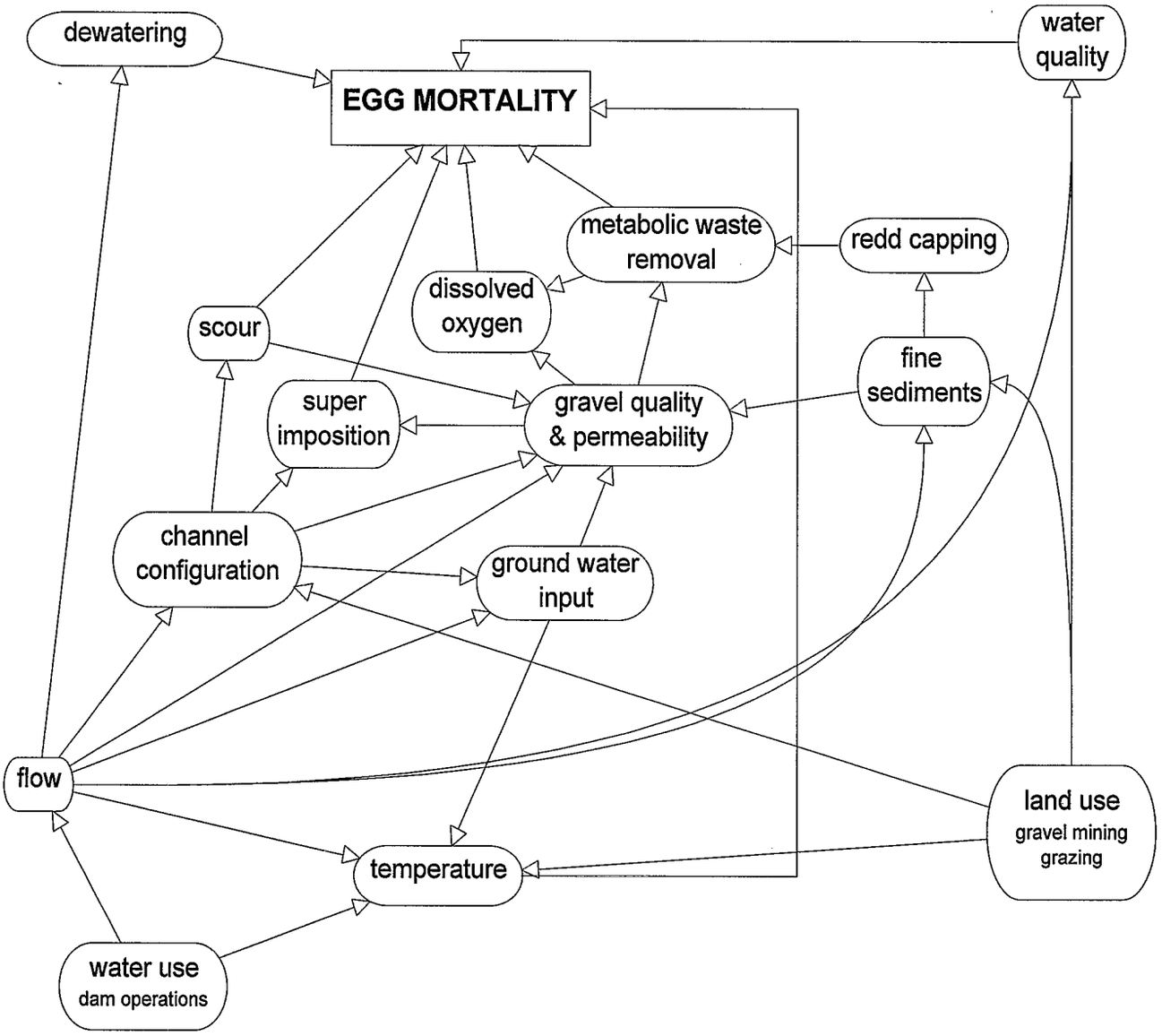

Figure 2. Stressor chart for fall run chinook salmon eggs in the Tuolumne River and Merced River.

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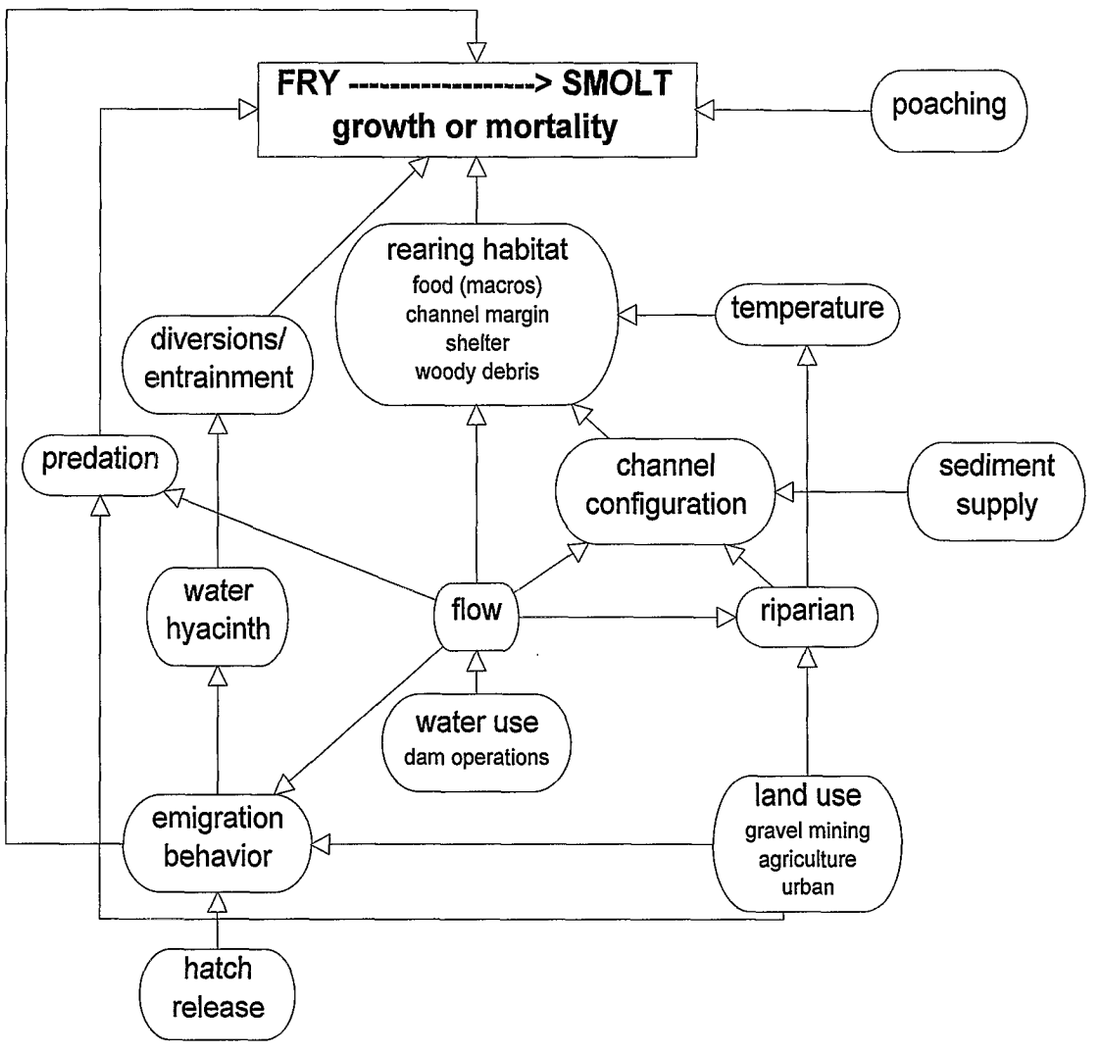

Figure 3. Stressor chart for fall run chinook salmon fry and smolts in the Tuolumne, Merced, and upper San Joaquin rivers.

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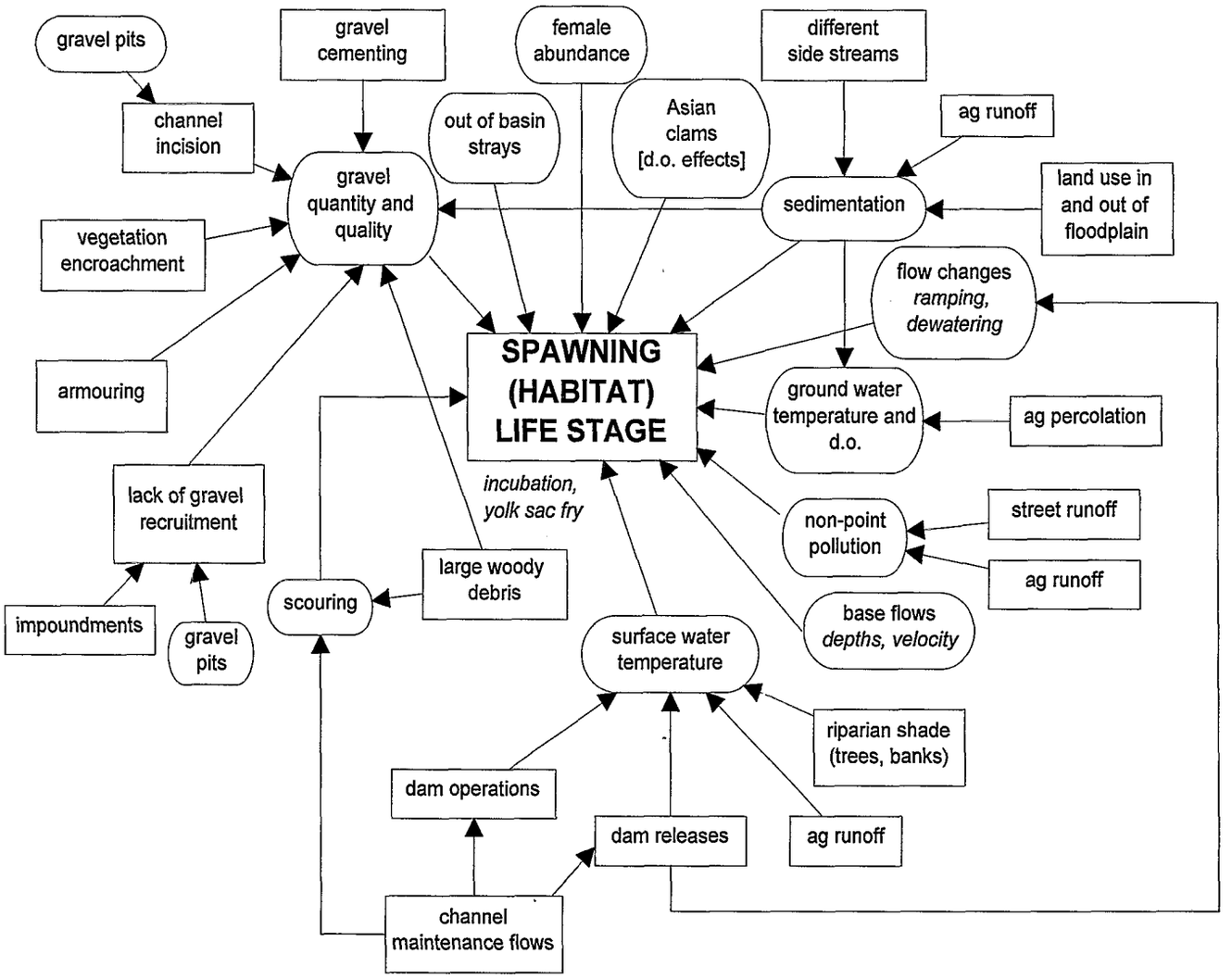

Figure 4. Stressor chart for spawning fall run salmon in the Stanislaus River and lower San Joaquin River.

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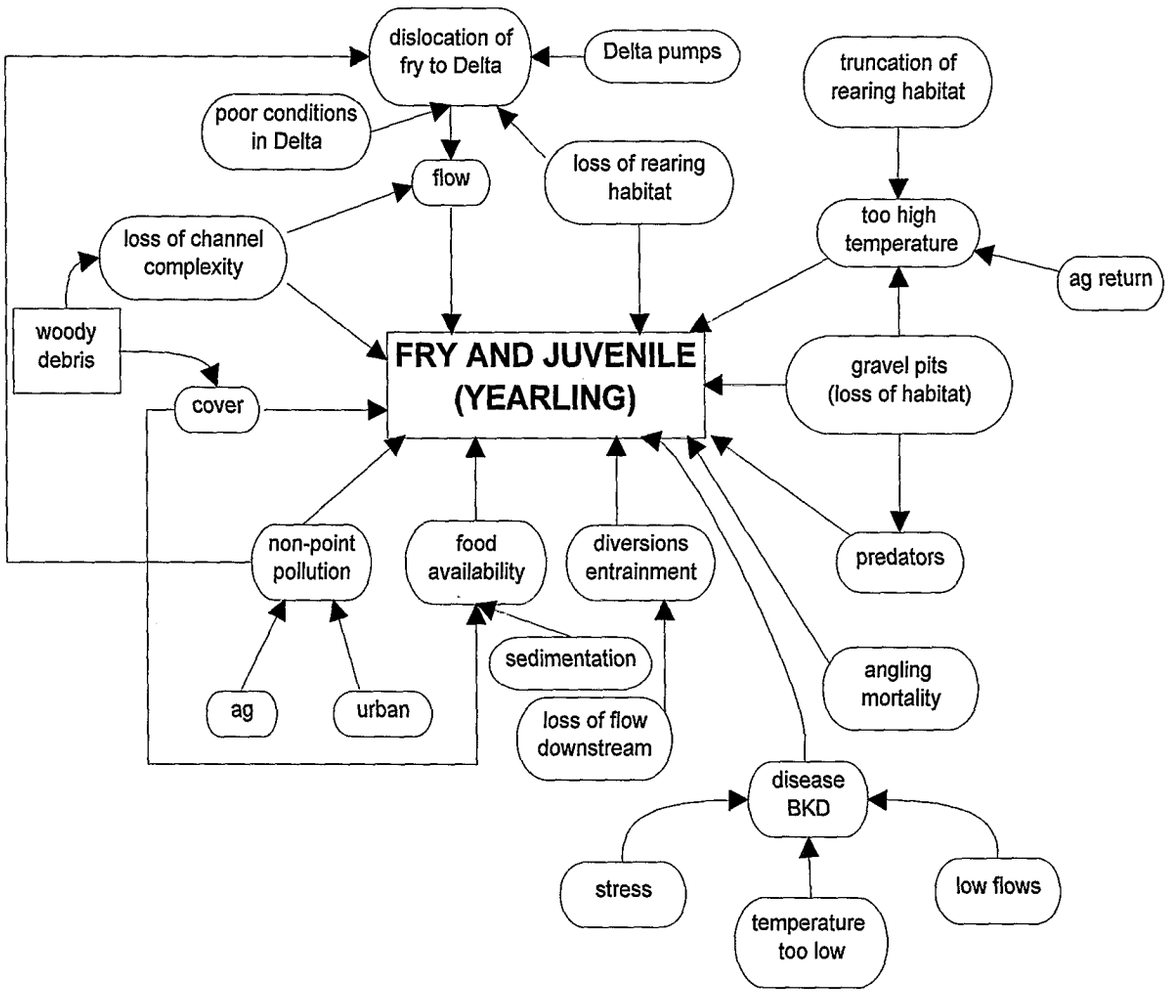

Figure 5. Stressor chart for yearling fall run chinook salmon in the Stanislaus River and lower San Joaquin River.

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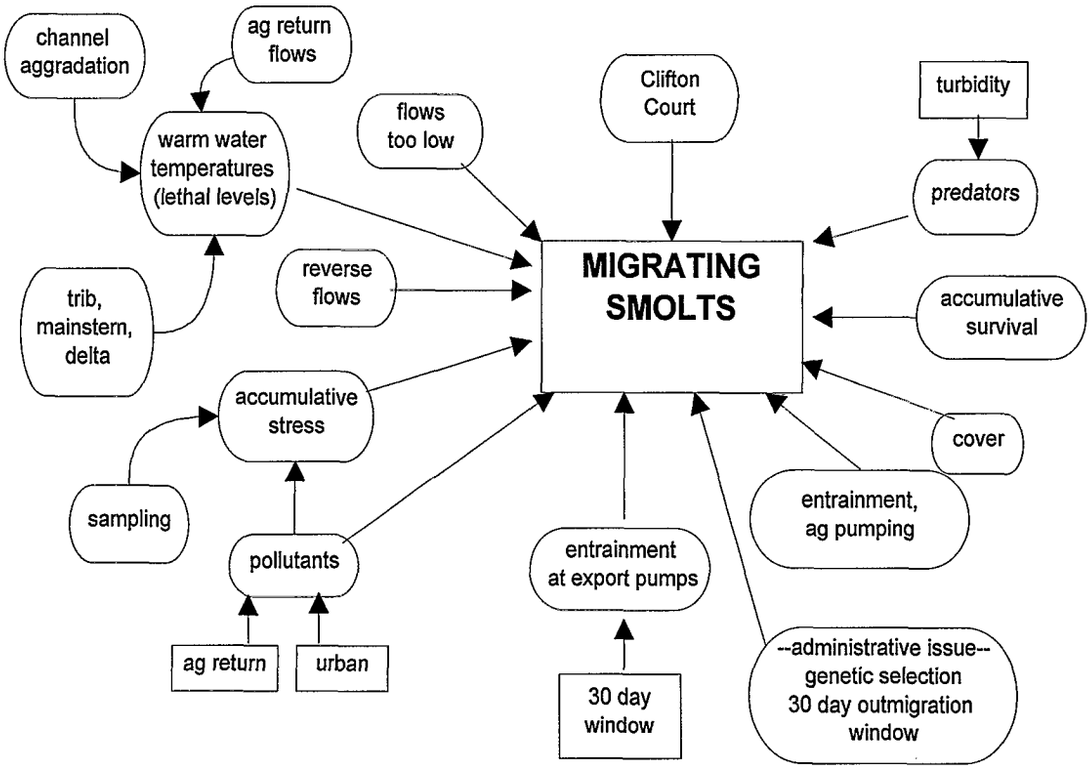

Figure 6. Stressor chart for fall run chinook salmon smolts in the Stanislaus River and lower San Joaquin River.

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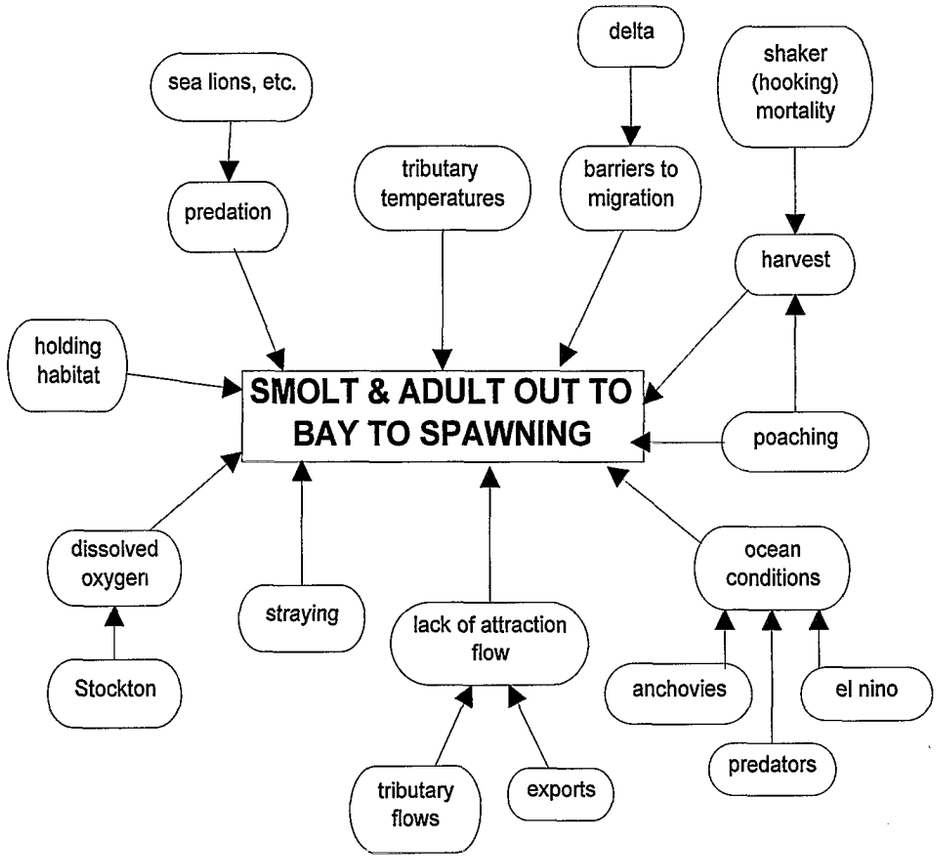

Figure 7. Stressor chart for fall run chinook salmon smolts and adults in the Stanislaus River and lower San Joaquin River.

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3.2 Stressors

Individual stressors identified by the subgroup for the Tuolumne, Merced, and upper San Joaquin rivers are listed in Table 1, along with the affected life stage. These stressors were then lumped into major restoration categories (Table 2) for consideration in the ranking of potential projects.

The most important stressor categories for the Stanislaus River and lower San Joaquin River are listed in Table 3, along with their relative priority for consideration in restoration projects. Other stressors identified by the subgroup but considered less important or adequately covered by the major stressors are found on the schematics for each of the life stages (Figures 4 to 7).

Each of the major ecological stressor groups, and a rationale for their inclusion as a focus of near-term restoration actions, are discussed below (in no particular order of importance).

Geomorphic Process and Related Fine Sediment and Gravel Issues

Alteration of the natural geomorphic processes in channels of the San Joaquin River tributaries was repeatedly cited as a major ecological stressor for fall run chinook salmon. Construction of upstream dams has cut off the supply of gravel to downstream areas, drastically altered the sediment budget, and changed the frequency and magnitude of channel forming flows.

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TABLE 1. STRESSORS ON FALL RUN CHINOOK SALMON IN THE TUOLUMNE, MERCED, AND LOWER SAN JOAQUIN RIVERS.

Stressor	Affected Life Stage			
	Adult	**Egg**	**Fry**	**Smolts**
Inadequate instream flows (for attracting adults, flushing flows for bed maintenance)	✓	✓	✓	✓
Poaching, illegal harvest	✓			✓ (including post-smolts)
Entrainment (water diversions)			✓	✓
Poor or missing spawning habitat	✓			
Habitat access (barriers to migration)	✓			
Predation (introduced species and others)			✓	✓
Stranding	✓	✓	✓	✓
Water temperature (surface)	✓ (fall)	✓	✓	✓
Water temperature (groundwater)		✓		
Large woody debris losses (refuge habitat)	✓ (holding)	?	✓	✓
Water pollution (agricultural organics)		✓	✓	✓
Ocean harvest	✓			
Ocean conditions (oceanographic)	✓	?		✓
Lack of shallow water rearing habitat			✓	✓
Flow patterns (outflow timing, variability)	✓	✓	✓	✓
Riparian vegetation loss	✓	✓	✓	✓
Lack of food supply	✓(?)		✓	✓
Migratory pathway changes	✓			✓

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Stressor	Affected Life Stage			
	Adult	**Egg**	**Fry**	**Smolts**
Hatchery management (genetics)	✓ (genetic integrity, fitness)		✓ (intraspecific interactions)	✓
Diseases	✓	✓	✓	✓
Accelerated sedimentation		✓	✓	
Introduced species	✓ (water hyacinth)	✓ (Asian clams)	✓ (Asian clams)	✓ (water hyacinth)
Gravel deficit	✓			
Lack of floodplain		✓ (redd scour)	✓ (high flow velocity)	
Gravel and gold mining effects (changes lotic to lentic system)	✓	✓	✓	✓
Channel form, channelization (sinuosity)			?	✓
Straying	✓			
Entrainment at Delta export pumps	✓		✓	✓
Delta flows				✓
Spawning bed armoring		✓	✓	
Low escapement	✓			
Global warming	✓	✓	✓	✓
Nutrient loss, reduced recruitment				✓
Fishing regulations		✓ (redd disturbance by anglers)		
Riparian vegetation encroachment		✓		

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TABLE 2. MAJOR RESTORATION CATEGORIES FOR STRESSORS ON FALL RUN CHINOOK SALMON IN THE TUOLUMNE, MERCED, AND UPPER SAN JOAQUIN RIVERS.

Restoration Category	**Life Stage**			**Basin**		
	Adult	**Egg**	**Fry & Smolt**	**Tuolumne**	**Merced**	**San Joaquin**
Downstream flows	✓		✓	✓	✓	✓
Geomorphic reconfiguration, spawning gravel rehabilitation	✓			✓	✓	?
Illegal harvest	✓		✓	✓	✓	✓
Straying	✓			✓	✓	✓
Riparian restoration	✓		✓	✓	✓	✓
Spawning redistribution	✓			✓	?	
Fine sediment management		✓		✓	✓	
Coarse sediment management		✓		✓	✓	
Spawning gravel (mechanical cleaning)		✓		✓	✓	
Flow management (temperature, velocity, depth)		✓		✓	✓	
Water quality (contaminent management)		✓		✓	✓	
Predator control			✓	✓	✓	✓
Fish screens			✓	✓	✓	✓
Water quality			✓	✓	✓	✓
Hatchery management			✓		✓	✓

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TABLE 3. MOST IMPORTANT STRESSOR CATEGORIES FOR FALL RUN CHINOOK SALMON IN THE STANISLAUS RIVER AND LOWER SAN JOAQUIN RIVER

Stressor Category	Priority votes	Life Stage			
		Adult	Spawners	Fry & Juvenile	Smolts
Harvest (Ocean and freshwater)	0	✓			✓
Migration delays (dissolved oxygen barriers, delta barriers, lack of attraction flows)	2	✓			
Poaching (upper 30 miles)	2	✓			
Ocean conditions	0	✓			
Gravel	6		✓		
Water temperature	6/2/8		✓	✓	✓
Flow regime	4/6		✓		✓
Sedimentation of spawning reach	6		✓		
Predation	0/5			✓	✓
Channel complexity, diversity	8			✓	
Entrainment	1				✓
Water quality/pollutants	4				✓
Accumulative stress (?)	0				?

In-channel or near-channel gravel mining has altered the gravel supply, and caused channel configuration changes that result in effects on spawning and rearing habitat, predation, water temperature, migration, and other factors which affect fall run chinook salmon. Changes in land use patterns (mining, agriculture, grazing, etc.) have led to increased fine sediment deposition, decreased riparian zone area, and reduced channel stability.

Restoration of a more natural geomorphic process or function is considered important because it will: 1) address fundamental causes of habitat degradation rather than simply deal with the effects, 2) provide benefits for a wide variety of species and life stages, and 3) be potentially long lasting and low maintenance.

Water Temperature Control

High water temperature is a major stressor in the SJR system that potentially affects all life stages of fall run chinook salmon. The particularly significant influence of high water

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temperature during the egg, fry, and smolt lifestages results in a cumulative mortality effect that could substantially reduce the number of outmigrants. Water temperature control would have positive effects on multiple life stages, and its benefits would thereby be "compounded" through the life cycle.

Projects which provide water temperature control could be multifaceted, providing benefits to numerous aquatic species as well as enhancements to water quality and terrestrial habitat, depending on the type of action. For example, restored riparian zones (which increase shade) could provide improved terrestrial habitat and better buffers for water quality control. Changes in flow management could result in improved salmon survival during critical time periods, due to lower temperatures and lower predation rates.

Flow Regime

Due to the regulated nature of all of the major SJR tributaries, flow regimes have a potentially significant effect on all life stages of fall run chinook salmon. Instream flows affect habitat quantity and quality through changes in depth, velocity, wetted area, water quality, sediment transport, and other factors. Similar to the water temperature stressor, flow regimes can have a cumulative effect on mortality of multiple life stages, and flow regime improvements therefore offer the potential for multiple life stage benefits.

Restoration actions which improve flow regimes for fall run chinook salmon potentially benefit

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other fish species, and may beneficially affect water quality. Since other restoration actions for fall run chinook salmon can be rendered relatively ineffective without sufficient flow at the proper time of year, flow regime management is a relatively critical stressor category to address.

Gravel Quantity and Quality

Spawning area in the SJR tributaries and mainstem has been significantly decreased due to dam construction that prevents access to upstream areas and limits gravel recruitment, mining that reduces the quantity of gravel, and floodplain changes that alter gravel supply. In addition, the quality of spawning gravel has decreased due to increased fine sediment deposition, and increased armoring related to flow changes and altered sediment budgets.

Restoration projects that target the reduced quantity and/or quality of spawning gravels address a key component of the salmon life cycle that may limit salmon populations in the San Joaquin system. Gravel replacement or restoration projects may also help restore fundamental geomorphic processes that benefit other species through changes in invertebrate productivity and riparian zone dynamics.

Water Quality

Degradation of water quality is a poorly understood, systemic stressor in the San Joaquin River basin that may have a negative cumulative effect on salmon production. Younger life stages of

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salmon are particular vulnerable to toxic chemicals that may originate from agricultural or urban runoff. The potential effect of contaminants, particularly in the tributaries, is not extensively researched and could be a significant indirect mortality factor.

The success of a variety of restoration projects could be limited if underlying water quality problems are not identified and addressed. Monitoring of water quality and assessment of its potential effect on salmon populations is a necessary component of an overall restoration strategy, and an adaptive management tool that can help target future restoration actions.

Predation

Predation is a natural mortality factor that can have an unnaturally significant effect on the salmon population when it is intensified by introduced species, habitat changes that favor the predator, or other changes that increase the vulnerability of the prey. Within the SJR system, substantial predation losses have been reported in the in-channel gravel pits that provide predator habitat and increased exposure to salmon fry and smolts.

Long term control of predation losses in the gravel pits is best accomplished through geomorphic projects that reduce or eliminate the in-channel pits. Short-term, interim predator control or evaluation efforts can contribute to increased salmon survival and a better understanding of potentially significant stressors in the system.

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Entrainment

Entrainment of salmon fry and smolts in various diversions within the SJR system and in the Delta can be a significant source of direct mortality, although altering the timing, duration, and magnitude of water diversion can significantly decrease the salmon losses. Screening of diversions is a near-term, documented restoration action that can further reduce entrainment and contribute to increased production of salmon from the SJR basin.

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4. RESTORATION PROJECTS, PROGRAMS, AND RANKINGS

Existing, proposed, or new projects and programs for the San Joaquin River system were assigned to one of the major stressor/restoration categories identified earlier in the process. Many of the projects were given a ranking of high, moderate, or low importance, which supplemented the Stanislaus/lower San Joaquin River subgroup's prioritization of stressor groups (i.e., there was overlapping prioritization of stressor/restoration categories and ranking of projects). Some projects have not yet received a ranking, due to lack of concensus among the workshop attendees. The list of projects identified to date, along with rankings (where known) and other information is tabulated in Table 4.

Brief project descriptions for many of the highest ranked projects already exist, and are included in Appendix F.

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Table 4: Draft Project List
CALFED/San Joaquin River Management Program Joint Technical Team Meeting
Bass Lake, January 1997

FISH SCREENS **Reduce or avoid juvenile salmonid entrapment.**	Writeup Number	Rank	Study or Project	Project Proponent	Merced	Tuolumne	Stanislaus	SJR below Merced	SJR above Merced	Readiness	Cost Estimate ($1,000)
Screen El Solyo and West Stanislaus riparian diversions near Hwy. 132	29	H	P	DFG				X		1	150
Screen maintenance		H	P		X	X	X				
Banta-Carbona fish screen	26	H	P	DFG, et al.				X		1	4,000
Small diversion fish screen replacement project	33	M	P	DFG	X	X	X			3	500
Feasibility study for screening five gravity feed diversions in spawning reach of Merced River	4	M	P	DFG	X					2	150
Small diversion screening program - identify and prioritize sites		H	S	DFG	X	X	X	X			
Patterson Fish screen feasibility study	27	H	S	DFG				X		2	100

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Table 4: Draft Project List
CALFED/San Joaquin River Management Program Joint Technical Team Meeting
Bass Lake, January 1997

ILLEGAL HARVEST	Writeup Number	Rank	Study or Project	Project Proponent	Merced	Tuolumne	Stanislaus	SJR below Merced	SJR above Merced	Readiness	Cost Estimate ($1,000)
Increase number of wardens		L	P	DFG	X	X	X				
Modify angling regulations		L	P	DFG	X	X	X				
Angler education programs	17	M	P	DFG	X	X	X	X	X		
PREDATOR CONTROL											
Physical removal of predators from gravel pits, including an assessment of impacts on salmon production		M	P		X	X	X				

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Table 4: Draft Project List
CALFED/San Joaquin River Management Program Joint Technical Team Meeting
Bass Lake, January 1997

FINE SEDIMENT MANAGEMENT	Writeup Number	Rank	Study or Project	Project Proponent	Merced	Tuolumne	Stanislaus	SJR below Merced	SJR above Merced	Readiness	Cost Estimate ($1,000)
Gasberg Creek sediment control	18/36	H	P	M/TID, DFG, TRTAC		X				2	50
Pilot gravel cleaning project	14	M	P	M/TID		X				2	200
On-farm ag drainage treatment		H	S				X			3	
Sediment management plan for Merced watershed (identify sources)		-	S		X					2	
Pilot gravel ripping study on Stanislaus			S				X			2	

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Table 4: Draft Project List
CALFED/San Joaquin River Management Program Joint Technical Team Meeting
Bass Lake, January 1997

COARSE SEDIMENT BUDGET (Includes spawning gravel)	Writeup Number	Rank	Study or Project	Project Proponent	Merced	Tuolumne	Stanislaus	SJR below Merced	SJR above Merced	Readiness	Cost Estimate ($1,000)
Purchase dredger tailings - Merced River Ranch	7	H	P	DFG	X					1	1,500
Spawning gravel introduction near LaGrange	36	H	P	TRTAC		X				1	155
Goodwin Canyon gravel replenishment	21	H	P	DFG, DOI			X			1	250
Goodwin Canyon Gravel Replenishment Monitoring	50*						X				250
Knights Ferry Gravel Replenishment	45*			Stockton East, ACOE			X				260
Knights Ferry Gravel Monitoring	46*			Stockton East, ACOE			X				140
Channel Restoration Site Monitoring at Oakdale Rec. Area	51*						X				370
Identify gravel sources for restoration		M	S				X				
Coarse sediment deficit/replenishment criteria : Merced	8	M	S	DFG	X					2	50
Coarse sediment deficit/replenishment criteria: Stan.	24		S	DFG			X			1	50
Identify locations to introduce gravel: Tuol., Merced		-	S	DFG	X	X					

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Table 4: Draft Project List
CALFED/San Joaquin River Management Program Joint Technical Team Meeting
Bass Lake, January 1997

WATER QUALITY ASSESSMENT/ POLLUTANTS	Writeup Number	Rank	Study or Project	Project Proponent	Merced	Tuolumne	Stanislaus	SJR below Merced	SJR above Merced	Readiness	Cost Estimate ($1,000)
Expand Real-time Water Quality Management Network	30	H	P	DWR, SJRMP	X	X	X	X	X	1	300
Incorporate Tuolumne model with RTWQMN		H	P	DWR, TID		X				1	
Reduce non-point pollution - expand contaminant project work team scope (IEP review and guidance)		H	P		X	X	X	X		1	
Establish monitoring for physio/chemical/temperature contaminants, including bioassays, dairy waste, impacts on food supply and dormant pesticide dispersal		M/ H	S		X	X	X	X	X	1	
Stanislaus Watershed Projects: East Stanislaus RCD	42*			East Stan. RCD			X				550

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Table 4: Draft Project List
CALFED/San Joaquin River Management Program Joint Technical Team Meeting
Bass Lake, January 1997

FLOW	Writeup Number	Rank	Study or Project	Project Proponent	Merced	Tuolumne	Stanislaus	SJR below Merced	SJR above Merced	Readiness	Cost Estimate ($1,000)
Water acquisition for all life stages		H	P		X	X	X	X			
Tuolumne River flow enhancement study	37	-	S	TRTAC		X				1	100
Study in-stream flow needs for smolt survival		H	S				X			1	
Assessment/Feasibility of channel maintenance flows		-	S				X			3	
Evaluate reoperation of New Melones to mimic seasonal variability		H	S				X			1	
Assess ground water management, water transfers, distribution system efficiency		H	S		X	X	X	X		3	

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Table 4: Draft Project List
CALFED/San Joaquin River Management Program Joint Technical Team Meeting
Bass Lake, January 1997

HATCHERY MANAGEMENT	Writeup Number	Rank	Study or Project	Project Proponent	Merced	Tuolumne	Stanislaus	SJR below Merced	SJR above Merced	Readiness	Cost Estimate ($1,000)
Interim Artificial propagation program	15	-	P	DFG	X	X	X	X		1	400
Hatchery fish marking program	32	H	P	DFG	X					1	130
Develop a hatchery strategy for the SJR		M	S		X	X	X	X	X	1	
Review and revise operation plan for Merced River Fish Facility		M	S	DFG	X					1	
Tuolumne River Hatchery Plan	13	-	S	DWR, DFG		X				1	1,000

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Table 4: Draft Project List
CALFED/San Joaquin River Management Program Joint Technical Team Meeting
Bass Lake, January 1997

MISCELLANEOUS	Writeup Number	Rank	Study or Project	Project Proponent	Merced	Tuolumne	Stanislaus	SJR below Merced	SJR above Merced	Readiness	Cost Estimate ($1,000)
Adult salmon counting structures	34	-	P	M/TID	X	X	X	X		3	300
Improving Stanislaus River Escapement Monitoring-Feasibility of Using Hydroacoustics	48*			Stockton East			X				180
Verification and Calibration of Screw-trap Estimates of Stan. River Outmigrants- Feasibility of Using Hydroacoustics	49*			Stockton East			X				195
National Wildlife Refuge- San Luis (?)		M									
National Wildlife Refuge- San Joaquin (?)		M									
STRAYING - Purchase Hills Ferry Barrier land	28	H	P	DFG, DWR	X	X	X	X	X	1	60
Tuolumne River Environmental Education Center	38	M	P	DFG		X				1	40
Tuolumne River Interpretive Center Conceptual Plan	17		P	DFG		X					50
Resources education program	31	-	P	DFG	X	X	X	X	X	2	200
GIS database of habitat and fluvial elements for Stan.	39	-	S				X			3	
Fall run salmon otolith and scale evaluation	41*			DFG	X	X	X				45
Stanislaus channel and flood plain maintenance policy	44*			Stan. Basin Stakeholders			X				11

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Table 4: Draft Project List
CALFED/San Joaquin River Management Program Joint Technical Team Meeting
Bass Lake, January 1997

TEMPERATURE **(Items not included under flow or riparian restoration.)**	Writeup Number	Rank	Study or Project	Project Proponent	Merced	Tuolumne	Stanislaus	SJR below Merced	SJR above Merced	Readiness	Cost Estimate ($1,000)
Supplemental money for Grasslands to change from March to April		H	S				X			2	
Action to ease water demand from New Melones for agricultural drainage		H	S				X			3	
Temperature management feasibility study - Merced	6	H	S	DFG	X					2	100
Temperature management feasibility study - Stanislaus	23,40*	H	S				X			2	200
Stanislaus River Temp Model and Operations Develop.	43*			Stakeholders			X				385

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Table 4: Draft Project List
CALFED/San Joaquin River Management Program Joint Technical Team Meeting
Bass Lake, January 1997

RIPARIAN REVEGETATION/RESTORATION	Writeup Number	Rank	Study or Project	Project Proponent	Merced	Tuolumne	Stanislaus	SJR below Merced	SJR above Merced	Readiness	Cost Estimate ($1,000)
Purchase and restore land at Basso Bridge	35	M	P	DFG		X				1	350
Restore area near LaGrange		-	P	TID		X				2	275
Manage post-flood land use for riparian growth		-	P		X	X	X	X	X		
Riparian restoration/revegetation - Tuolumne River near LaGrange	39	-	P	TRTAC		X				1	275
Riparian preservation(e.g. conservation easements)		H	S		X	X	X	X	X	3	
Riparian revegetation projects		M	P	-	X	X	X	X	X		
Riparian Habitat Restoration, Stanislaus River	47*						X				70

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Table 4: Draft Project List
CALFED/San Joaquin River Management Program Joint Technical Team Meeting
Bass Lake, January 1997

GEOMORPHIC RECONFIGURATION/ CHANNEL COMPLEXITY **Projects**	Writeup Number	Rank	Study or Project	Project Proponent	Merced	Tuolumne	Stanislaus	SJR below Merced	SJR above Merced	Readiness	Cost Estimate ($1,000)
Graupner Channel Restoration Project	20	H	P	DFG, DWR			X			2	250
Oakdale Recreation Area channel restoration	22	H	P	DFG			X			3	4,000
Ratzlaff Ranch (includes coarse sediment component)	1	H	P	DFG, DWR	X					2	4,000
Robinson Ranch (includes coarse sediment component)	2	H	P	DFG, DWR	X					3	2,000
Gallo Ranch (includes coarse sediment component)	3	H	P	DFG	X					3	200
Reed Channel Restoration Project	10	H	P	DWR, DFG et al.		X				1	490
Special run-pool 9-10	11	H	P	M/TID, et al.		X				1	4,000
Special run-pool 5-6	12	H	P	M/TID		X				2	4,000
M.J. Ruddy floodplain restoration	16	H	P	M/TID, DFG		X				2	1,500
Willms Channel Restoration Project	19	H	P	DFG, DWR et al.			X			1	1,600
Willms Channel Restoration Project Monitoring	52*						X				330
Floodway and levee reconstruction near Waterford	53*		P	TRTAC, et al.		X					TBD

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Table 4: Draft Project List
CALFED/San Joaquin River Management Program Joint Technical Team Meeting
Bass Lake, January 1997

GEOMORPHIC RECONFIGURATION/ CHANNEL COMPLEXITY **Studies**	Writeup Number	Rank	Study or Project	Project Proponent	Merced	Tuolumne	Stanislaus	SJR below Merced	SJR above Merced	Readiness	Cost Estimate ($1,000)
Coord. manage. of woody debris with other agencies		M	S				X			3	
Post-flood assessment		H	S		X	X	X	X	X	1	
Merced River Crocker-Huffman to Cressey	5	H	S	DFG	X					1	300
Merced River watershed assessment	9	H	S	SJRMP	X					2	250
Stanislaus watershed assessment	25	H	S	SJRMP			X			2	250
Channel maintenance flow assessment			S				X				

LEGEND

H = high priority
M = medium priority
L = low priority
- = no consensus

P = project
S = study

1 = ready to implement
2 = preliminary planning completed

* = description submitted independently after the workshop. No group discussion of the proposal.

Prepared by PJLandis (DWR) and SDWilcox (EA)
F:\projects\calfed\sdw\sjoaquin\projlist.wpd, 13 February 1997

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5. CONCLUDING COMMENTS

The workshop concluded with a discussion of comments on the procedures and process used during the preceding two days. Suggestions were solicited for changes which would benefit future workshops in other geographical areas. The following comments were recorded.

- Develop the life cycle/stressor flow charts (or at least a draft for discussion) ahead of time, so more of the group time could be spent on other activities.
- Transmit background materials sooner, to allow for a more thorough review and preparation of comments prior to the workshop.
- Allow 2.5 days for the conference, perhaps by reserving the evening when participants arrive for presentations of background information.
- Develop a better ranking system for prioritization of potential projects.
- Spend more time back in the plenary session after the break-out groups, in order to discuss more of the details of each respective group's decisions.
- Place more emphasis on ecosystem wide concerns, rather than primarily on chinook salmon. Examples might include other indicator elements, geomorphic approaches, identification of projects that simulate natural processes, etc. The ecosystem level emphasis might be facilitated by an ecosystem presentation at the beginning of the workshop.
- The good attendance was a positive factor for the workshop.
- Provide more direction for the breakout groups to the final products can be more readily integrated.
- Have more presentations from people working in the field.
- Re-evaluate whether the groups really needed to break out into subgroups.
- Identify investigative needs, such as water quality.
- Address other species and biophysical factors.

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In addition to the suggestions for improving future workshops, the participants identified concerns outside of the geographical focus of the workshop that needed to be considered. It was noted that the factors outside of the San Joaquin River basin could affect fall run chinook salmon populations to such an extent that restoration actions within the basin would not be fruitful. Concerns recorded for areas outside of the San Joaquin basin included the following:

- Migration blockage due to dissolved oxygen barriers
- Ocean fishery effects
- Delta barriers
- Effects of SWP and CVP, including entrainment and reverse flows
- Ocean conditions
- Upstream flow issues (including releases from Friant Dam)

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APPENDIX A

Workshop Agenda and Attendee List

Joint CALFED/SJRMP
San Joaquin River Fishery Technical Team Meeting
January 15 - 16, 1997
Bass Lake

Draft Agenda

Workshop Objective *Develop a package of prioritized fishery restoration projects to be implemented over the next three to five years.*

Wednesday - January 15

7:30 - 8:30	Breakfast
8:30 - 9:00	Introductions
9:00 - 10:00	Review of Workshop Objectives and General Information
10:00 - 10:15	Break
10:15 - 11:00	Present a brief history of the SJR system including an overview of habitat and population conditions
11:00 - 12:00	Present findings of existing studies and management plans including goals and objectives for restoration
12:00 - 1:00	Lunch
1:00 - 3:00	Identify and prioritize problem areas and limiting factors
3:00 - 3:30	Break
3:30 - 5:00	Identify solutions
6:30	Dinner

Thursday - January 16

7:30 - 8:30	Breakfast
8:30 - 10:00	Identify solutions (continued)
10:00 - 10:15	Break
10:15 - 12:00	Prioritize solutions
12:00 - 1:00	Lunch
1:00 - 3:00	Get consensus on package of projects
3:00 - 3:30	Break
3:30 - 4:00	Finalize funding package as a SJRMP Report
4:00 - 5:00	Follow-up workshop to address regulatory and permitting issues

- Workshop to address regulatory and permitting issues
- Advice on improving meeting format

Attendee List

CALFED/SJRMP Joint Technical Team Meeting
Bass Lake, January 15-16, 1997

Name	Affiliation	Phone number
David Bernard	CalFed/ESSA	(604) 733-2996
Jennifer Bull	CDFG	(209) 948-7435
John Cain	UCB	(510) 486-0963
Steve Cramer	Cramer Assoc.	(503) 669-0133
Cindy Darling	CalFed	(916) 657-2666
Kevin Faulkenberry	DWR	(209) 445-5236
Steve Ford	DWR	(916) 227-7534
Tim Ford	MID/TID	(209) 883-8275
Kate Hansel	CalFed	(916) 653-1103
Susan Hatfield	EPA	(415) 744-1994
Dale K. Hoffman-Floerke	DWR	(916) 227-7530
Elise Holland	The Bay Institute	(415) 721-7680
Bill Johnston	Modesto Irrigation District	(209) 526-7384
Fred Jurick	CDFG	(916) 657-4226
Bill Kier	Kier and Assoc.	(415) 331-4505
Paula J. Landis	DWR	(209) 445-5289
Sam Lohr	USFWS	(209) 946-6400
Bill Loudermilk	CDFG	(209) 243-4005 ext. 141
Alice Low	CalFed/CH2M Hill	(916) 920-0212 ext. 282
Scott McBain	McBain and Trush	(707) 826 -7794
Clarence Mayo II	DFG	(209) 222-3761 ext. 171
Carl Mesick	Mesick Consultants	(916) 620-3631

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Peter Moyle	CCSF/U.C. Davis	(916) 752-6355
Tim Ramirez	Tuolumne River Preservation Trust	(415) 292-3531
Pete Rhoads	MWDSC	(916) 650-2620
Stephan Spaar	DWR	(916) 227-7536
Tom Taylor	Trihey & Assoc.	(510) 689-8822
Martha Tunder	CA Center for Public Dispute Resolution	(916) 444-2161
Jennifer Vick	Phil Williams Assoc.	(415) 981-8363
Scott Wilcox	CalFed/EA	(916) 924-7450
Kevin Wolf	Stanislaus Basin Stakeholders Facilitator	(916) 758-4211
Marcia Wolfe	MHWA for FWUA	(805) 837-1169

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APPENDIX B

Summary of Presentation by Jennifer Vick

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Summary of Presentation by Jennifer Vick
CALFED/SJRMP Workshop
January 15-16, 1997

The Merced River is a provides a typical example of the type and scale of human impacts that have occurred on the San Joaquin River east side tributaries - the Tuolumne, Stanislaus, and Merced Rivers. Each has undergone similar patterns of dam construction, flow diversion, gold mining, and aggregate mining.

Flow in the Merced River is controlled by four mainstem dams and several tributary dams. The largest of the mainstem dams is the New Exchequer, which controls runoff from 82% of the watershed. This dam was closed in 1967 and has a capacity of 1.03 million acre-feet (or 105% of the average annual runoff of the watershed). It replaced the original Exchequer Dam, which was closed in 1926 and had a capacity of 281,000 acre-feet.

The dam stores high winter and spring flows, releasing water during the summer for diversion into the Merced Irrigation District's Main Canal. The flow storage and diversion alter downstream hydrology by reducing winter storm and spring snowmelt peaks, converting the annual hydrograph from its dynamic natural pattern to a nearly uniform pattern.

The river also has been subject to extensive gold and aggregate mining. Between 1907 and 1952, the river and floodplain in the vicinity of Snelling were dredged for gold. In this process, the channel bed and floodplain were excavated to the depth of bedrock (about 25 feet) by continuous bucket dredges. The gold was removed from the alluvium and the remaining material was redeposited in windrows on the floodplain. This process converted 7.6 square miles of floodplain to cobble-armored windrows.

Large-scale aggregate mining began in the 1940s and continues today. Until the 1970s, mines excavated sand and gravel directly from the river bed, leaving behind large pits in the channel. After 1970, mines began excavating pits in the floodplain adjacent to the river channel. These pits were separated from the river by narrow berms, which often breached during high flows. A total of 8 in-channel and 22 terrace mines were identified on the Merced River. Seven of the terrace mines were captured or breached.

Mining has left behind 5.6 river miles (273 acres) of in-channel or captured pits in the Merced River between Snelling and Cressey, converting 33% of the spawning reach to slack-water lakes. In addition, the mines removed between 7 and 14 million tons of stored bed material from the channel and floodplain. This amount equals 22-to-91 times the amount of bed material that would have been supplied to the lower watershed in the absence of the dam.

In addition to the impacts described above, damming and mining have resulted in extensive floodplain and channel alteration. Major impacts include the following: reduced in-channel and floodplain complexity, facilitation of floodplain encroachment and elimination of the slough complex formerly located between Snelling and Shaffer Bridge, a 33% reduction in average channel width, channel incision, and bed armoring.

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With the degree of alteration in bed material supply and transport in the lower river, there are no mechanisms by which the Merced River can be restored by natural processes. Restoration of fluvial processes and ecological functions in the lower watershed will require human intervention.

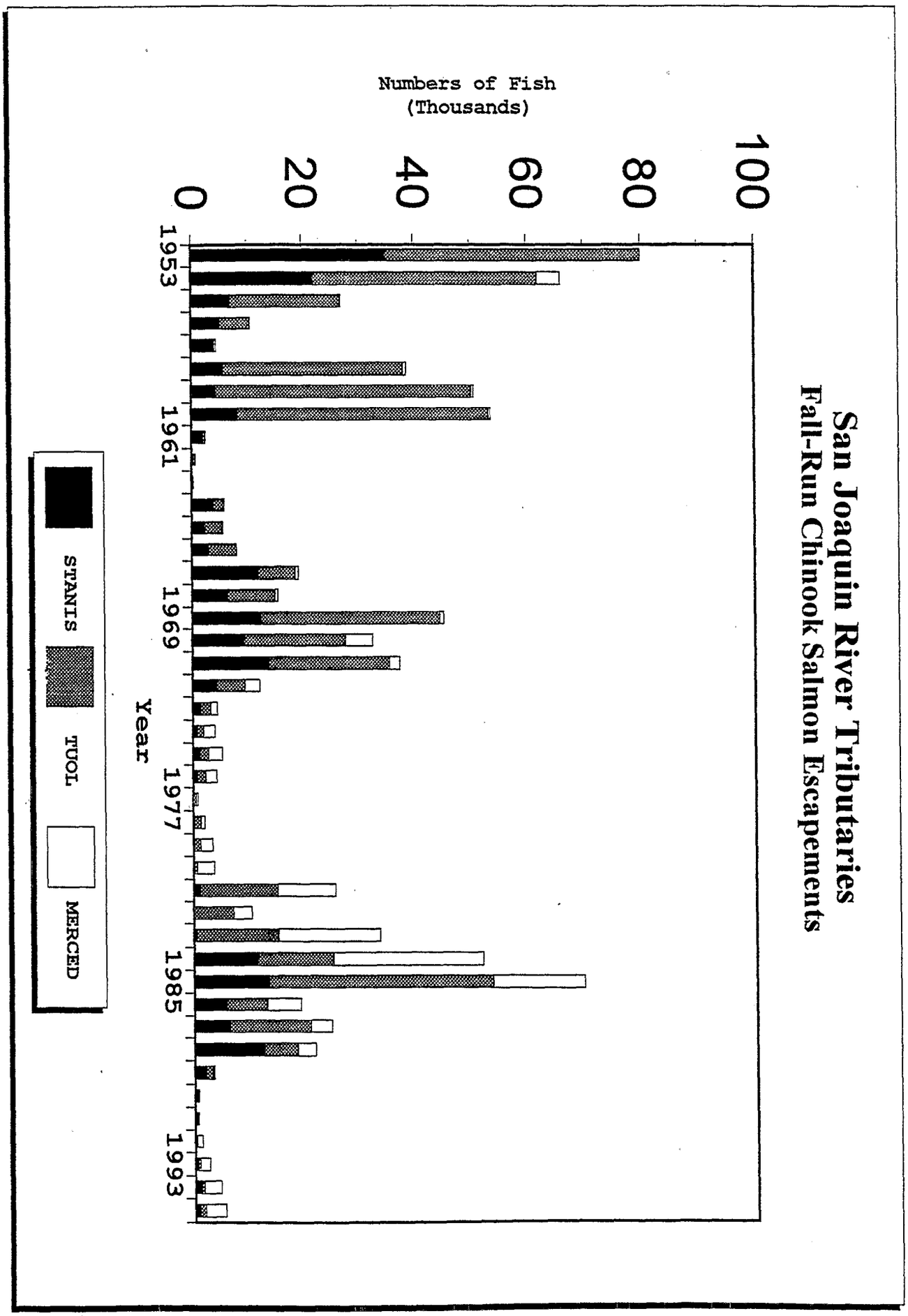
More detailed information from this research project is presented as Chapter 8 of the following report:

Kondolf, G.M., J.C. Vick, and T.M. Ramirez. 1996. Salmon Spawning Habitat in the Merced Tuolumne, and Stanislaus Rivers, California: An Evaluation of Project Planning and Performance. University of California Water Resources Center Report No. 90, Davis, CA.

APPENDIX C

Escapement Data From Bill Loudermilk

D-026213


San Joaquin River Tributaries
Fall-Run Chinook Salmon Escapements
Numbers of Fish
(Thousands)
0
20
40
60
80
100
1953
1961
1969
1977
1985
1993
Year
STANIS
TUOL
MERCED

D-026214

APPENDIX D

Summary of Comments by David Bernard
[TO BE ADDED]

APPENDIX E

Summary of presentation by Paula Landis

Fishery Restoration Programs and Funding Sources
Presentation by Paula J. Landis
CALFED/SJRMP Workshop
January 15-16, 1997

A high level of frustration is being felt by water users and fish protection agencies at the slow progress being made toward improving conditions for salmon on the San Joaquin system. Water users see themselves as being blamed for the decline in fish populations and at the same time they see millions of dollars they have contributed to fund projects not being spent. Fish agencies are frustrated by the difficulty in accessing those same funds. The California Department of Fish and Game also feels they are being pressured to come up with projects for the sake of projects without consideration for the potential benefits of those projects.

In an attempt to resolve this problem, SJRMP provided a forum to bring together interested parties and stakeholders to examine why the system is not working and determine how to change it. The first step in this process was to identify existing funding sources and the criteria for awarding funding. The results of this investigation included identifying funding sources, project submittal requirements, deadlines, contact person, determining the similarities and differences in funding source requirements, and listing potential projects. This information that is being used to move projects forward to implementation, by matching project benefits with funding program priorities and by combining funding from different programs. The next step will be to prioritize project proposals and determine which funding sources each proposal should be submitted to.

CALFED/SJRMP San Joaquin River Fishery Restoration Technical Team Meeting
January 14 -16, 1997

Existing Studies and Management Plans
Bass Lake

Introduction

Most fishery restoration programs have developed management plans to meet the objectives of their funding requirements. These plans range from general guidelines to the identification of specific projects. The majority of fishery related funding programs focus on natural production and non-flow related solutions to fishery issues. Some plans were drafted independent of any specific funding program. These types of plans, developed without the restraints of funding requirements, may provide a more complete picture of problems and solutions faced by fishery restoration interests in the San Joaquin River basin.

Funding Program Management Plans

CALFED Bay-Delta Program	Ecosystem Restoration Program Plan Implementation Objectives and Targets, working draft November 1996.
CVPIA - AFRP	A Plan to Increase Natural Production of Anadromous fish in the Central Valley of California, draft December 1995.
Department of Fish and Game Wildlife Conservation Board	California Riparian Habitat Conservation Program, January 1995.

Management Plans
Not tied to a specific funding source.

Department of Fish and Game	Restoring Central Valley Streams: A Plan for Action, November 1993.
San Joaquin River Management Program	An Action Plan for San Joaquin Fall-Run Chinook Salmon Populations, January 1993.

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Existing Studies

Introduction

This is list of existing studies is intended to serve as a starting point for discussion. Many studies that are conducted internally by agencies and groups are never formally published for generally use. A complete and comprehensive list of studies could be helpful in avoiding the duplication of effort and in identifying areas where studies are needed.

San Joaquin River

Department of Water Resources	Comprehensive Needs Assessment for Chinook Salmon Habitat Improvement Projects in the San Joaquin River Basin, March 1994.
Department of Water Resources	San Joaquin River Tributaries Spawning Gravel Assessment, November 1994.

Merced River

Department of Fish and Game	Merced River Water Supply, June 1990.

Tuolumne River

EA Engineering	Don Pedro Project fisheries study report, 1992.
Turlock Irrigation District	New Don Pedro FERC Settlement Agreement, adopted 1996.
McBain and Trush	Tuolumne River Watershed Analysis, in progress.

Stanislaus River

Department of Fish and Game	Effect of New Melones Project on fish and wildlife resources of the Stanislaus River and Sacramento-San Joaquin Delta. October 1972.
S.P. Cramer & Associates, Inc,.	Effects of pulse flows on juvenile chinook migration in the Stanislaus River, 1993.
S.P. Cramer & Associates, Inc,.	Effects of pulse flows on juvenile chinook migration in the Stanislaus River, 1995.

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Thomas R. Payne & Associates	The Effects of Minimum Instream Flow Requirements, Release Temperatures, Delta Exports, and Stock on Fall-Run Chinook Salmon Production in the Stanislaus and Tuolumne River, May 1996.
Thomas R. Payne & Associates	Spawning Habitat Limitations for Fall-Run Chinook Salmon in the Stanislaus River Between Goodwin and Riverbank, draft report July 1996.
U.S. Bureau of Reclamation	Stanislaus River basin temperature model, draft report 1993.

Prepared and Presented by Paula J. Landis, DWR

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San Joaquin River Management Program
FISHERY RESTORATION PROGRAMS AND FUNDING SOURCES
January 1997

Programs and Funding Sources	Contact Person/Title	Agency Street Address	Mailing Address	Phone Number Fax Number	e-mail address
CVPIA Anadromous Fish Restoration Plan	Sam Lohr Fisheries Biologist	USFWS 4001 North Wilson Way Stockton, CA 95205	same	(209) 946-6400 (209) 946-6355	slohr@ mail.fws.gov
CVPIA Anadromous Fish Screen Program	Ron Bachman Project Manager AFSP	USFWS 3310 El Camino Sacramento, CA 95821	same	(916) 979-2760 (916) 979-2770	Ronald_Bachman @fws.gov
CVPIA Spawning Gravel/ Riparian Habitat	Larry Puckett Restoration Program ~~Liaison~~ C.M.	USFWS 3310 El Camino Sacramento, CA 95821	same	(916) 979-2760 (916) 979-2770	Larry_Puckett @fws.gov
CALFED - including Category III	Cindy Darling Restoration Coordinator	CALFED Bay-Delta 1416 Ninth Street, 1155 Sacramento, CA 95814	same	(916) 653-5950 (916) 654-9780	cdarling @water.ca.gov
Four Pumps Agreement (DWR/DFG)	Steve Ford Environmental Program Manager	DWR 3251 "S" Street Sacramento, CA 95816	same	(916) 227-7534 (916) 227-7554	sford @water.ca.gov
Tracy Pumps Agreement	Pat Coulston Supervising Biologist	DFG 4001 North Wilson Way Stockton, CA 95205 1416	same	(209) 948-7800 (209) 946-6355	pcoulsto@ delta.dfg.ca.gov
Wildlife Conservation Board	Scott Clemons Riparian Program Manager	WCB 801 K Street, Suite 806 Sacramento, CA 95814	same	(916) 445-1072 (916) 323-0280	clemons@ mailbag.des. ucdavis.edu
New Don Pedro Settlement Agreement	Tim Ford Aquatic Biologist	TID/MID 333 E. Canal Drive Turlock, CA 95380	P.O. Box 949 Turlock, CA 95381	(209) 883-8275 (209) 632-3864	tjford@ainet.com

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San Joaquin River Management Program
FISHERY RESTORATION PROGRAMS AND FUNDING SOURCES
January 1997

Programs and Funding Sources	**Contact Person/Title**	**Agency Street Address**	**Mailing Address**	**Phone Number Fax Number**	**e-mail address**
CDFG Fishery Restoration Grants (Salmon Stamp & Proposition 70)	Harvey E. Reading Inland Fisheries Division	CDFG Inland Fisheries Division 1416 Ninth Street Sacramento, CA 94244	P.O. Box 944209 Sacramento, CA 94244-2090	(916) 654-5628 (916) 654-8099	103731,2032. compuserve.com
USACOE, Section 1135	Jinji Kobayashi, Chief San Joaquin Basin Branch and Planning Division	USACOE 1325 J Street Sacramento, CA 95814	same	(916) 557-6778 (916) 557-7856	not available

Two potential funding sources identified previously have been removed from this list. Funding provided by the City and county of San Francisco is inlcuded in the New Don Pedro Settlement Agreement. The Department of Conservation does not have funding for river restoration work.

Prepared by Paula J. Landis, DWR

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San Joaquin River Management Program
Restoration Programs and Funding Sources
Not directly connected to the San Joaquin River or Fall-run Chinook Salmon
January 1997

Programs and Funding Sources	Contact	Phone Number
Caltrans	Cathy Crossett-Avila	(916) 227-8035
Ducks Unlimited		(916) 363-8257
1996 USDA Farm Bill	U. S. Dept. of Agriculture Washington D.C. 20250	
CDFG Steelhead Catch Program	Terry Jackson, CDFG	(916) 654-1811
CDFG Striped Bass Stamp	Don Stevens, CDFG	
Bay Delta Regional Initiative	Alexis Strauss, EPA	
Federal Land & Water Acquisition Fund	Gary Zamh	
CWA Grant Funding	Alexis Strauss, Walt Pettit EPA, SWRCB, RWQCB	
California Waterfowl Association	Bill Gaines	
Energy and Water Fund	USBR	
San Francisco Bay Program	Rick Morat, USFWS	
State Revolving Fund	Walt Pettit, SWRCB	
Proposition 99	Terry Mills, CDFG	
Environmental Enhancement and Mitigation Program	California Transportation Commission	
Delta Flood Protection Act	Curt Schmutte, DWR Ed Littrell, DFG	
Private Foundations		

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San Joaquin River Management Program

FISHERY RESTORATION PROGRAMS AND FUNDING SOURCES

January 1997

Programs and Funding Sources	Species Specific	Geographic Boundary	Priority Projects	B/C Ratio	Cost-Share (applicant/source)	Fund Feasibility	Preliminary Design	Environmental Review	Final Design	Administration & Consultants	Monitoring Funded	Repair & Maintenance	Repayment Clause	Reimbursable Startup Funds	Formal Applications	Filing Date	Phased Projects
AFRP	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y
Fish Screen Program	Y	Y	N	N	50/50	Y	Y	Y	Y	Y	N	N	N	Y	Y	N	Y
Spawning Gravel Rest.	Y	Y	Y	N	25/75	~~N~~ Y	~~N~~ Y	Y	Y	N	N	N	N	N	N	N	Y
CALFED / Category III	Y	Y	Y	N	S	Y	Y	Y	Y	?	Y	S	?	Y	Y	Y	Y
Four Pumps Agreement	Y	Y	Y	S	N	Y	Y	Y	Y	Y	S	Y	N	?	N	N	Y
Tracy Pumps Agreement	Y	Y	S	N	N	S	Y	Y	Y	Y	N	S	N	Y	N	N	Y
WCB Wildlife Cons. Bd.	Y	N	N	N	25/72	N	Y	Y	Y	Y	S	N	Y	?	Y	N	Y
Don Pedro Agreement	Y	Y	N	N	S	Y	Y	Y	Y	Y	Y	Y	N	?	N	N	Y
DFG Fishery Restoration	Y	N	Y	N	S	N	Y	N	Y	Y	N	N	?	S	Y	Y	Y
USACOE, Section 1135	N	N	N	Y	S	Y	Y	Y	Y	Y	S	N	N	N	N	N	Y

N = No
Y = Yes
S = In some cases
? = A steering committee decision is required or no official rule exists.

Prepared by Paula J. Landis

D—026224

APPENDIX F

Brief Project Descriptions

PROJECT TITLE: RATZLAFF RANCH CHANNEL RESTORATION (#1)

LOCATION: Merced River near Hopeton, just downstream of Highway J59 Bridge.

PROBLEM ADDRESSED: Failure of floodplain gravel mining levees has resulted in ponded sections of the Merced River channel within the designated salmon spawning and nursery area (Fish and Game Code 1505). Water depths increase and velocities decrease forming lacustrine habitat within a key salmon nursery area. Abnormally high predator densities are maintained in and near these areas. The physical loss of channel, floodplain and riparian function, combined with elevated temperatures and higher predation rates has degraded both the habitat quality and quantity.

BENEFITS: Restore more natural function in the low flow channel, floodplain and riparian areas, reestablish usable nursery habitat, and reduce mortality of juvenile salmonids (fry and smolt) due to predation.

PROJECT DESCRIPTION: Biologists, fluvial experts and engineers will develop conceptual, preliminary and final design plans to restore more effective habitat and natural functions at this site. Construction activities will focus on modifying or restoring the breached levees and ponded areas to a) isolate these areas from the restored riverine habitats, or b) modify them so they function as floodplain area. Site-specific features, design criteria, benefits and environmental concerns and cost factors will all influence the restoration design.

This area is one of the largest and most complex problem areas on the Merced River. It is just downstream of and linked to the **Robinson Ranch Channel Restoration** project. Combined, these two projects can restore over three miles of important salmon spawning and nursery habitat.

ESTIMATED COSTS: $4,000,000 Cost-share partners will be needed for this project to proceed in 1998-99 or later.

STATUS: Funding from the "4-Pumps" Agreement has been approved for DWR San Joaquin District to develop preliminary design plans and develop up to four specific project proposals for this site. Aerial photograph have been obtained and preliminary design work will be completed by June, 1997. The aerial photograph coverage was extended upstream to include the Robinson Ranch area to assist in preliminary planning there as well. Several project proposals for the Ratzlaff Ranch area are anticipated to exceed funding capabilities under the "4-Pumps" Agreement.

PROJECT PROPONENT: DFG and DWR thus far. Lead entities to be defined.

PROJECT TITLE: ROBINSON RANCH CHANNEL RESTORATION (#2)

LOCATION: Merced River near Hopeton, just upstream of Highway J59 Bridge.

BENEFITS: Restore more natural meander pattern and function in the low flow channel, floodplain and riparian areas, reestablish useable salmon spawning and nursery area, reduce the risk of stream capture of adjacent gravel extraction ponds (pits), and restore a favorable alignment of the channel under the J59 bridge (structure protection). Erosion protection will be included as a project purpose. This reach has supported up to 20% of the natural salmon spawning activity in the Merced River in the past.

PROJECT DESCRIPTION: Biologists, fluvial experts and engineers will develop preliminary and final design plans. Several specific project proposals may be prepared for this site. These may be phased over several years. Construction activities may include levee set-backs, enhancing existing levees, fill, channel realignments, gravel replenishment, designed channel areas to enhance salmon spawning, and restoring meander patterns and protection of the bridge structure (footings) along 1.5 miles of the Merced River. This area is just upstream of the **Ratzlaff Ranch Channel Restoration project.** Design plans must be linked to ensure proper river function in the area. together these two projects can improve over three miles of the Merced River.

ESTIMATED COST: $2,000,000 Cost-share partners will be need for this project to proceed in 1998-99 or later.

STATUS: Aerial photographs and ground surveys have been completed by DWR, San Joaquin District with funding under the "4-Pumps" Agreement. We anticipate several preliminary project proposals will be developed. These may be phased over several years. Negotiations with the landowner are underway by DFG. Preliminary design plans and project proposals for several salmon spawning and nursery habitat improvements and restoration of floodplain and riparian function will follow completion of DFG negotiations. Due to the influence of this reach on the Highway J59 bridge we anticipate that CALTRANS may also participate. A backwater analysis will be performed early in the design phase. The landowner (or gravel company) will have partial responsibility for at least one aspect of the project due to CEQA requirements on a previous gravel mining project.

PROJECT PROPONENT: DFG and DWR at this time. Lead entity to be defined.

PROJECT TITLE: GALLO RANCH RESTORATION PROJECT (#3)

LOCATION: Merced River near Hopeton, approximately five miles downstream of Highway J59 bridge.

BENEFITS: Develop phased plans and proposals to restore more natural function in the low flow channel, improve spawning gravel quantity and quality, improve floodplain and riparian function, reduce erosion, and screen priority water diversions and return channels to protect juvenile and adult salmonids along one mile of the river.

PROJECT DESCRIPTION: Development of phased program proposals for restoration along one mile of salmon spawning and nursery habitat. Disturbance to meander patterns, side channels, erosion and a high percentage of fine substrates, unscreened water diversion and activities in the floodplain has reduce the spawning and nursery potential of this area. Engineering support is needed to assist DFG and the landowner in developing a phased restoration program. Preliminary and final design plans and phased restoration funding proposals would be developed by DFG under this project.

ESTIMATED COST: $200,000

STATUS: The majority of this project is in the conceptual stage at this time. Discussion with the landowner indicates strong interest in compatible restoration activities. The first phase was initiated by DFG in conjunction with the landowner in 1996. Adult salmon migration barriers (temporary weirs) were installed in two agricultural return channels to avoid loss of recruitment and encourage in-river spawning.

Engineering support for preliminary and final design plans is needed for DFG to develop phased project funding proposals for channel/habitat restoration and a fish screen on a gravity diversion. Construction of the projects developed are anticipated would require additional funding and would likely occur beginning in 1999.

PROJECT PROPONENT: DFG

PROJECT TITLE: RIPARIAN DIVERSION SCREENING FEASIBILITY (#4)

LOCATION: Five gravity riparian diversions within the designated spawning area of the Merced River between Crocker-Huffman Dam and Highway J59 bridge.

BENEFITS: Reduce losses of salmonid fry, juvenile and smolts associated with gravity riparian diversions.

PROJECT DESCRIPTION: Provide engineering support to DFG to evaluate screen effectiveness and develop feasibility recommendations for modification or replacement of existing fish screens and bypass systems on five riparian diversions ranging from 20 to 100 cfs. This project would be followed by DFG coordination with water right holders and landowners and preparation of proposals to fund design and construction of identified priority screen modifications or replacements.

ESTIMATED COST: $150,000

STATUS: Three of the five riparian diversion screens were modified and improved in the mid-1980's through the SB 400 program (Sen. Keene). Water-powered screens and nominal bypass systems were installed on two larger diversions while gabion-type screens without bypass systems remain on the other three diversions. Wing-dams are constructed/repaired each year at inlet channels to adjust river stage and facilitate water diversions. This system has been in place for many years and changes are needed to more effectively protect juvenile salmonids.

This project is in the concept stage of development. Engineering support is needed for DFG, and the affected interest parties, to develop feasible project proposals to improve the efficiency and effectiveness of the screen on these riparian diversions. A post-flood inspection will occur once the 1997 high flows subside to evaluate temporary repairs needed this year. This proposal focuses on a longer time horizon and the identification of the feasibility and preliminary cost estimates for fish screen repairs or replacements at these five diversions. If engineering support is provided in FY 1997-98 specific project proposals could be anticipated beginning in FY1998-99.

PROJECT PROPONENT: DFG and affected parties. Lead entity to be defined.

PROJECT TITLE: CHANNEL RESTORATION FEASIBILITY (#5)

LOCATION: Merced River from Crocker-Huffman Dam downstream to Cressey.

BENEFITS: Provide technical support for early planning and preliminary engineering design plans for five additional channel restoration projects on the lower Merced River. The planning provided by this project will help insure that a progression of restoration projects will continue beyond the 1998-2000 period.

PROJECT DESCRIPTION: Biological and engineering information will be compiled and preliminary design plans and project proposals will be prepared for five priority channel restoration projects. Costs for final design plans, permitting, construction, maintenance and monitoring would be identified in the project proposals. Upon subsequent funding approval of these project proposals, construction on the projects proposed would be anticipated beginning in the year 2000 and extending for 3-5 years.

ESTIMATED COST: $300,000

STATUS: This project is in the conceptual stage at this time. Experience suggests that the rate at which restoration projects proceed is strongly determined by the level of early planning and the development of sound project proposals for funding. Absent adequate funding and technical support for project development the rate of project completion, and hence restoration of physical and biological functions, may continue at a slow pace.

PROJECT PROPONENT: DFG and interested parties. Lead entity to be defined.

PROJECT TITLE: TEMPERATURE MANAGEMENT FEASIBILITY STUDY (#6)

LOCATION: Lake McClure, Lake McSwain, Merced Falls, Crocker-Huffman Dam and Merced Irrigation District headworks, and the lower Merced River downstream to its confluence with the San Joaquin River.

BENEFITS: Improved natural habitat conditions in a greater frequency of years resulting in better survival and production of a)natural salmonids in the Merced River, and b) artificial production at Merced River Hatchery. Improved spawning and incubation temperatures in the fall and improved rearing temperatures in the spring and early summer may be feasible and would benefit natural production in the Merced River. The value-added aspect of this project is the potential to improve spawning, incubation and rearing conditions, and reduce or help control warm water fish disease outbreaks at Merced River Hatchery.

PROJECT DESCRIPTION: This is the first of three phases of a project to develop improved water temperature management capabilities for salmonid habitats in the lower Merced River. Refinement of existing temperature reservoir and stream temperature models, operational criteria from Merced Irrigation District (MID) and biological needs defined by resource management agencies, would be integrated into an analysis and report describing feasibility and recommendations for designs and implementation efforts. Strong coordination with MID and other affected parties would occur. A contractor would prepare and submit draft and final reports defining the feasibility and recommend a course of action(s) for improved management of water temperature in the Merced River below Crocker-Huffman Dam.

Beyond this initial phase, funding for design, construction and the implementation phases should be anticipated. Again, close coordination with MID, resource management agencies, and affected parties would be necessary.

ESTIMATED COST: $100,000

STATUS: Negotiations between DFG and MID are underway. The parties are discussing the need to evaluate the potential and alternative approaches to improve temperature management on the lower Merced River below Crocker-Huffman Dam. Refined temperature modeling and integration of operational information would help the parties resolve this important issue and lead to improved salmonid habitat conditions in a greater frequency of years. Financial assistance to augment existing technical expertise of these parties is needed to assist with the feasibility study and recommendations regarding temperature management.

PROJECT PROPONENT: DFG and interested parties. Lead entity to be defined.

D—026231

D-026231

PROJECT TITLE: MERCED RIVER RANCH ACQUISITION (#7)

LOCATION: Near Snelling, one mile below Crocker-Huffman Dam

BENEFITS: Restoration of 318 acres of riparian forest, wetlands and aquatic habitats while providing a large and cost-effective supply of sand, gravel and cobble for channel restoration projects nearby in the Merced River. Long-term management of riparian forest and access to the Merced River for gravel replenishment would be secured.

PROJECT DESCRIPTION: DFG would acquire in fee title, restore and manage 318 acres of riparian forest, wetlands, adjacent river bank and grassland habitats in perpetuity. The land would be acquired, a surface mining and reclamation plan would be developed, environmental documents prepared, adopted and certified, and necessary infrastructure would be established. Restoration of the site would be implemented incrementally over approximately 10-15 years. Removal and reconfiguration of surface dredger tailings would help restore the site and provide cost-effective materials for various channel restoration projects nearby. It is estimated that 3-4 million yards of usable construction material exists on site.

ESTIMATED COST: $1,500,000

STATUS: The DFG Lands Committee and the Management Committee have reviewed the Land Acquisition Evaluation and recommended to the DFG Director that the acquisition proceed. Initially, funding is needed to support the real estate activities of the Wildlife Conservation Board to acquire the parcel, on behalf of DFG. Contracting for the mining and reclamation plan, environmental permits, easements and developing the necessary infrastructure for the restoration activity to proceed would follow. Restoration activities could begin within four years of the acquisition, and upon completion of all necessary planning and environmental documents, certifications, easements and assurances.
Construction products (sand, gravel, cobble) would be made available pursuant to subsequent project proposals, and the funding necessary to support staff and maintain and operate equipment to complete phased construction of restoration features at the Merced River Ranch site. The initial investment ($1,500,000) in the land, mining and restoration plan and infrastructure would not be amortized to increase the cost of construction materials provided. Thus, cost-effective material (3-4 million yards) would be assured over the longer term through the initial investment provided by this project. Integrating this project with a number of future channel restoration projects may result in a more cost-effective restoration effort, while avoiding further mining excavations in floodplain areas.

PROJECT PROPONENT: DFG

PROJECT TITLE: COARSE SEDIMENT BUDGET/REPLENISHMENT CRITERIA (#8)

LOCATION: Merced River

BENEFITS: Define the needs for future spawning gravel recruitment and establish criteria for artificial replenishment in the designated spawning area below Crocker-Huffman Dam

PROJECT DESCRIPTION: Contract with appropriate technical experts to define the Merced River's "appetite" for coarse sediment, and develop initial criteria (procedures) for replenishing this important component to restore river functions. Funding for this proposal would be used to match existing funds approved for DFG use under Proposition 70. Monitoring and evaluation of the pilot replenishment projects previously funded will provide useful information in developing these criteria.

ESTIMATED COST: $50,000

STATUS: Recently, the Proposition 70 Committee approved $50,000 for DFG to have such criteria developed for the Merced River. The importance of coarse sediment in river functions is well documented. It is also recognized that large gravel deficits exists below the dams on controlled streams, yet regular supplies of clean gravel are needed for healthy biological functions. Pilot gravel replenishment projects are proposed. Appropriate criteria for the volumes, placement and dispersion strategies and replenishment frequencies are needed before large scale and long-term gravel replenishment efforts are initiated. .

PROJECT PROPONENT: DFG and interested parties

D-026233

D-026233

PROJECT TITLE: MERCED RIVER WATERSHED ASSESSMENT (#9)

LOCATION: Merced River and effective adjoining watershed

BENEFITS: Provide broad-scale perspective on all habitat improvement and restoration activities planned for the lower Merced River. Help design plans and treatments on the cause of habitat problems rather than the symptoms.

PROJECT DESCRIPTION: Contract with appropriate experts to review and assess the present physical, hydrological and biological functions and help define of the key limiting factors and stressor in the Merced River watershed. Prepare a report providing watershed-level recommendations to help focus habitat restoration efforts.

ESTIMATED COST: $250,000

STATUS: This project is in the conceptual stage at this time.

PROJECT PROPONENT: SJRMP Action Team

D—026234

D-026234

PROJECT TITLE: REED CHANNEL RESTORATION PROJECT(#10)

LOCATION: Tuolumne River, upstream of Waterford and below Roberts Ferry Bridge.

BENEFITS: Reduce juvenile and smolt salmon mortality in a stream-captured gravel pit, restore riparian vegetation and floodplain function, and enhance salmon spawning and rearing habitats.

PROJECT DESCRIPTION: See current detailed proposal to the "4-Pumps" Committee.

ESTIMATED COST: $490,000

STATUS: Due to initial investments under the "4-Pumps" program the project design plans and permitting has been or is in the process of completion. The project is scheduled for construction in the summer of 1997 and 1998 if cost-share funding commitments are met. Review of design plans and construction schedule may be necessary following the January, 1997 flood event.

PROJECT PROPONENT: DWR, DFG, CVPIA and Reed Gravel, Inc.

D—026235

D-026235

PROJECT TITLE: SPECIAL RUN-POOL PROJECT 9-10 (#11)

LOCATION: Tuolumne River near Waterford

BENEFITS: Restore more natural river configuration and function of floodplain and low flow channel within important nursery and migratory habitat.

PROJECT DESCRIPTION: See detailed proposal from Modesto/Turlock Irrigation District consultants.

ESTIMATED COST: $4,000,000

STATUS: Project design is complete and initial review by responsible agencies has been provide. Permitting, environmental compliance and construction schedules are pending. Funding commitments under the Tuolumne Settlement Agreement and CVPIA are in place. Review of existing design plans may be necessary following the January, 1997 flood event. construction is anticipated within three years.

PROJECT PROPONENT: M/TID, DOI, Tuolumne River Technical Advisory Committee

D—026236

D-026236

PROJECT TITLE: SPECIAL RUN-POOL PROJECT 5-6 (#12)

LOCATION: Tuolumne River near Waterford

BENEFITS: Restore more natural river configurations and function of floodplain and low flow channel within important salmon nursery and migratory habitat.

PROJECT DESCRIPTION: See M/TID project proposal

ESTIMATED COST: $4,000,000

STATUS: Preliminary design plans under development. Conceptual plan has been discussed with interested parties. Final design plans, permits, environmental documents and funding commitments are pending. Construction is anticipated within three years.

PROJECT PROPONENT: M/TID

D — 0 2 6 2 3 7

D-026237

PROJECT TITLE: TUOLUMNE RIVER HATCHERY PLANNING (#13)

LOCATION: Tuolumne River near La Grange, upstream of Highway J59.

BENEFITS: Supplement natural production with careful artificial propagation to help maintain adequate spawning escapement and ensure more consistent use of restored spawning and nursery habitats. Help maintain existing genetic diversity. Help restore and maintain local sport fisheries and the sport and commercial fisheries along the Pacific Coast.

PROJECT DESCRIPTION: A small supplementation hatchery is proposed for the Tuolumne River by DFG and DWR. Salmon migrating up the Tuolumne River would be trapped at two or more sites each fall, and throughout the spawning period. A conservative cap or ceiling on annual production at this facility would be established (e.g. 1.5 million smolts). Egg take would be apportioned, or adjusted, so that gametes from throughout the duration of the run, both up and down river spawners , would be represented in the hatchery production each year. Genetic and other monitoring would be performed on regular intervals and contingency operations will be defined. Auditing and reporting requirement will be established to help ensure the protocols adopted are followed. As natural runs decline we anticipate that hatchery production may decline. As natural runs increase, hatchery production would also increase, but only up to the cap or ceiling level. Careful management, appropriate sizing and necessary features for innovative operation of the facility, and a good monitoring and reporting protocols are anticipated for the preferred alternative.

ESTIMATED COST: $1,000,000

STATUS: The current planning activity is focused on development of the Hatchery Operations Plan, refining cost estimates for several facility features, and exploring options for funding the construction and operation of such a facility. Funding for the next phase of planning will soon be requested through the "4-Pumps" Agreement. Completion of the environmental documents and design plans is anticipated over the next 2+ years. As currently planned, the first year of production for the proposed facility is 2002. A five-member Genetic Review Committee has been established to assist with refinement of the Hatchery Operations Plan, and Stakeholder group meeting are held bi-monthly to provide interested parties with planning updates and receive regular input.

PROJECT PROPONENT: DFG and DWR

PROJECT TITLE: PILOT GRAVEL CLEANING PROJECT (#14)

LOCATION: Tuolumne River near La Grange, below Old La Grange Bridge

BENEFITS: Evaluate changes in adult salmon use and the relative improvement in infiltration rates, dissolved oxygen and survival-to-emergence eggs deposited in a pilot riffle.

PROJECT DESCRIPTION: Construction and testing of a mechanical gravel cleaning device to a) remove fine sediments from spawning substrates Riffle 1A. The detailed project proposal would be reviewed by responsible and trustee agencies and all necessary permits or agreements obtained. Cleaning activities would occur in advance of fall salmon spawning activity. A monitoring program would be implemented to evaluate the benefits of this approach to cleaning gravels, relative to a control(similar untreated sites) nearby. Results would be summarized, evaluated and a brief report prepared summarizing the initial merits of the pilot project and making recommendations for future utility of this method. Longer term monitoring of some parameters would be appropriate to evaluate the longevity of perceived benefits.

ESTIMATED COST: $200,000

STATUS: This project is in the conceptual stage at this time. Preliminary work with this type of gravel cleaning equipment was evaluated in the Tuolumne River in the past on a small scale.

PROJECT PROPONENT: M/TID

D—026239

D-026239

PROJECT TITLE: INTERIM ARTIFICIAL PROPAGATION PROGRAM (#15)

LOCATION: Tuolumne River Facility (TRF) near La Grange

BENEFITS: Provide up to 300,000 salmon smolts of Tuolumne River origin for Settlement Agreement Studies on the Tuolumne River, instead of using Merced River Hatchery (MRH) stock. Free up a like amount of production at Merced River Hatchery for priority South Delta, Stanislaus and Merced river study and management programs.

PROJECT DESCRIPTION: Adult salmon returning to spawn in the Tuolumne River would be trapped each fall from 1997 through 2001 (5 years) at up to two sites. Specified mating would occur onsite, and fertilized eggs would be transported to Merced River Hatchery for incubation. Shortly after hatching and emergence, and after feeding begins, the offspring would be returned to the Tuolumne River and reared to smolt size in an unused section of the Modesto Irrigation District main canal. Feeding and regular health inspections would be provided. The fish would be tagged with coded-wire tags or marked prior (at MRH or TRF) to release for study or management purposes.

ESTIMATED COST: $400,000

STATUS: This project is in the conceptual stage at this point. DFG has notified parties interested in obtaining hatchery smolts for study purposes that such a project may be necessary to meet the already large and growing demand for study fish of San Joaquin basin origin. The Herbold/Hanson Plan, evaluations of the Head of Old river Barrier, and studies on the Stanislaus River are examples of this growing demand. Strides on the Merced River are intensifying as well and the demands for smolts for those studies will have priority over others. Prior to the construction and operation of the proposed Tuolumne River Hatchery (2002) this project may prove effective in providing additional hatchery fish for studies. Based on past experience, remote trapping and spawning programs can be marginally successful in some situations. As the proposal develops this spring we can make a better assessment of the probability of success.

PROJECT PROPONENT: DFG and interested parties.

PROJECT TITLE: M.J. RUDDY FLOODPLAIN RESTORATION (#16)

LOCATION: Tuolumne River near Waterford, downstream of Roberts Ferry Bridge.

BENEFITS: Restore more natural channel configuration, floodplain function and low flow channel habitat value. Avoid stream capture of old gravel mining pit adjacent to the active channel. Avoid sluicing of fine sediment into the Tuolumne River and siltation of gravel substrates downstream. Isolate a large backwater area know to absorb heat energy and support higher predator fish densities.

PROJECT DESCRIPTION: Major channel modifications at two sites near the M.J. Ruddy and Sons, Inc. (now Santa Fe Gravel) plant site would be restored. Upstream, a large backwater area would be isolated from the Tuolumne River by fill material, configured to provide reasonable floodplain function, including establishment of riparian vegetation. Downstream of the plant site and on the opposite side of the river, an old mining pit and levee system now perched next to the river would be modified to provide more adequate floodplain capacity and function under high flow conditions. the near-vertical levee would be "laid back" or moved back and a new levee established if necessary to accommodate necessary channel cross-sections at this site. To the extent feasible, salmonid nursery habitat would be restored in these two areas. Work would be performed in two phases, or simultaneous if cost-effectiveness dictates.

ESTIMATED COST: $1,500,000

STATUS: This project is conceptual at this time. A site review is necessary following the January 1997 flood to evaluate the merits of these projects.

PROJECT PROPONENT: DFG and M/TID

PROJECT TITLE: TUOLUMNE RIVER INTERPRETIVE CENTER CONCEPTUAL PLAN (#17)

LOCATION: Tuolumne River Restoration Center, near la Grange.

BENEFITS: Define the scope and a Conceptual Plan for a resources-based interpretive and educational Center for Stanislaus County visitors near La Grange. Enhance the diversity of uses and understanding of natural resource values and the importance of historic and future uses. Provide a venue for a multi-agency educational program in a natural setting along the river. Integrate state, federal, local and private interests into a common goal. Compliment the other features of the Tuolumne River Restoration Center.

PROJECT DESCRIPTION: Retain appropriate expertise to prepare a Conceptual Plan, complete with a definition of scope, conceptual design, a listing potential partners and a proposed "road map" beyond the Conceptual Plan to steer interested parties toward implementation. Duties include liaison and coordination with private, local state and federal government and the public to define scope, and graphic artist to depict an acceptable design of needed facilities, definition for the proposed. A steering committee comprised of appropriate parties would be formed and a lead agency selected t manage the contract. The land has already been acquired by the State (DWR), with this purpose identified by DFG over the long term.

ESTIMATED COST: $50,000

STATUS: This project is in the conceptual stage at this time.

PROJECT PROPONENT: DFG

D—026242

D-026242

PROJECT TITLE: GASBERG CREEK SEDIMENT CONTROL FEASIBILITY (#18)

LOCATION: Gasberg Creek Watershed, near La Grange

BENEFITS: Reduce fine sediment erosion and discharge into the Tuolumne River near upstream end of the primary salmon spawning areas. Control further deposition of deleterious fine sediment into the designated salmon spawning area.

PROJECT DESCRIPTION: Contract evaluation of the feasibility of a program to reduce erosion and fine sediment loads originating from the Gasberg Creek watershed, and subsequent discharge into the lower Tuolumne River. Prepare a phased project proposal to implement a feasible sediment control program, in cooperation with responsible entities.

ESTIMATED COST: $50,000

STATUS: This project is in the conceptual stage at this time.

PROJECT PROPONENT: M/TID

PROJECT TITLE: WILLMS CHANNEL RESTORATION PROJECT (#19)

LOCATION: Stanislaus River downstream of Knights Ferry

BENEFITS: Restore more natural channel configurations, floodplain and low flow channel function, isolate warmwater predator habitats and restore salmonid spawning and nursery habitat values.

PROJECT DESCRIPTION: See detailed project proposal approved under the "4-Pumps" Agreement

ESTIMATED COST: $1,600,000

STATUS: If the funding commitments under the "4-Pumps" Agreement, CVPIA, and Proposition 70 are met this project will begin construction in FY 1997-98. All design work is completed, and permits and environmental documents have been obtained or are in process. Cost-sharing opportunity may exist.

PROJECT PROPONENT: DFG and DWR, DOI, Proposition 70 Committee

D—026244

D-026244

PROJECT TITLE: GRAUPNER CHANNEL RESTORATION PROJECT (#20)

LOCATION: Stanislaus River downstream of Knights Ferry

BENEFITS: See Willms Project benefits.

PROJECT DESCRIPTION: See "4-Pumps" project proposal. Generally similar to the Willms Project but without the predator isolation component and a few site specific features.

ESTIMATED COST: $250,000

STATUS: Planned for final design, permitting and environmental documents under the "4_Pumps" Agreement in FY1998-99. Preliminary design work has been completed. Cost-share opportunity may exist.

PROJECT PROPONENT: DFG and DWR

PROJECT TITLE: GOODWIN CANYON GRAVEL REPLENISHMENT (#21)

LOCATION: Stanislaus River upstream of Knights Ferry, below Goodwin Dam

BENEFITS: Restore useable spawning substrates for salmonids in the canyon reach immediately below Goodwin Dam and at Two-mile Bar. Much of the useable gravel have move out of this reach yet many spawning salmonids move into the area. This gravel will continue to move downstream, thereby provide recruitment in an otherwise "gravel hungry" river section. Tracer rock will be added and monitoring of gravel movement and fish use will occur over the next several years. A summary report will be prepared to assist in future project of this kind.

PROJECT DESCRIPTION: A mixture of desirable gravel will placed in Goodwin Canyon. Due to poor access, a gravel pumping system and hand labor will be need. See detailed project proposal for Salmon Stamp/Proposition 70/CVPIA funding.

ESTIMATED COST: $250,000

STATUS: CVPIA has made preliminary commitments and encumbered funding for this project. Cost-share opportunities may exist.

PROJECT PROPONENT: DFG and DOI

PROJECT TITLE: OAKDALE RECREATION AREA CHANNEL RESTORATION (#22)

LOCATION: Stanislaus River near Oakdale.

BENEFITS: See Ratzlaff Ranch Channel Restoration Project and , Willms Channel Restoration Project. Although the habitat damage at the Ratzlaff site is more extensive the benefits are similar.

PROJECT DESCRIPTION: This is a major channel restoration project that will require large amounts of fill material and equipment time to construct. A detailed description will be provided at the time the funding proposal is prepared.

ESTIMATED COST: $4,000,000 (preliminary)

STATUS: This project is still in the conceptual planning stages.

PROJECT PROPONENT: DFG

PROJECT TITLE: TEMPERATURE MANAGEMENT FEASIBILITY STUDY (#23)

LOCATION: New Melones, Tullock and Goodwin Reservoirs and Dams, and the lower Stanislaus River to its confluence with the San Joaquin River. Spicer Meadows Reservoir and Collierville Power Project and possibly the Tri-Dam project features and Sand Bar Projects as well.

BENEFITS: See Temperature Management Feasibility Study for the Merced River. The benefits are similar for natural fish in the Stanislaus River.

PROJECT DESCRIPTION: See Temperature Management Feasibility Study of the Merced River. The work here will be more extensive because there has been less progress under the 1987 Agreement between DFG and USBR in comparison to the work on the Merced River.

ESTIMATED COST: $200,000

STATUS: This project is in the conceptual stage at this time. Although repeatedly recommend to USBR, and more recently to DOI under the CVPIA, funding has not yet been dedicated.

PROJECT PROPONENT: DFG

D—026248

D-026248

PROJECT TITLE: COARSE SEDIMENT BUDGET/REPLENISHMENT CRITERIA (#24)

LOCATION: Stanislaus River

BENEFITS: See similar project proposal for the Merced River.

PROJECT DESCRIPTION: See similar project proposal for the Merced River.

ESTIMATED COST: $50,000

STATUS: See similar project proposal for the Merced River.

PROJECT PROPONENT: DFG

D—026249

D-026249

PROJECT TITLE: STANISLAUS RIVER WATERSHED ASSESSMENT (#25)

LOCATION: Stanislaus River and effective adjoining watershed.

BENEFITS: See Merced River Watershed Assessment

PROJECT DESCRIPTION: See Merced River Watershed Assessment

ESTIMATED COST: $250,000

STATUS: This project is in the conceptual stage at this time.

PROJECT PROPONENT: SJRMP Action Team

PROJECT TITLE: BANTA CARBONA FISH SCREEN (#26)

LOCATION: San Joaquin River near Vernalis

BENEFITS: Protect rearing and outmigrant salmonids from entrapment or impingement mortality at this 249 cfs diversion.

PROJECT DESCRIPTION: Proceed with final design plan, construction and operation of a "V" screen with bypass located at the mouth of the Banta Carbona Irrigation District inlet canal.

ESTIMATED COST: $4,000,000

STATUS: A feasibility report was prepared and 50% of the funding of this project has been set encumbered under the CVPIA. Some non-federal matching funds have been secured for final design (DFG- $100,000 Proposition 70; $??? Category III). The remaining 50% match required under the Unscreened Diversions Program (CVPIA)
has not yet been identified. A management agreement is being negotiated between DFG and BCID to define respective responsibilities for long term operation, maintenance and repairs of the new screen. An assessment of the impacts of the January 1997 flood at this site is necessary.

PROJECT PROPONENT: DFG, BCID and DOI

PROJECT TITLE: PATTERSON FISH SCREEN FEASIBILITY (#27)

LOCATION: San Joaquin River near Patterson

BENEFITS: Reduce or avoid juvenile salmonid impingement and entrapment mortality at this large riparian diversion from the San Joaquin River.

PROJECT DESCRIPTION: Patterson Water District (PWD) operates a large pump station on the San Joaquin River each year. Contracting for fish screen feasibility analyses would be performed under this project. Alternative screen design suitable for possible installation and operation at this diversion would be identified and evaluated after preliminary survey of the site and review of PWD operational needs. Coordination with the multi-agency Fish Screen Committee will be necessary. A report summarizing the basic features, dimensions and operations of the PWD facility and defining the alternative fish screen design for this site will be prepared (draft and final). A preferred alternative should be recommended.

ESTIMATED COST: $100,000

STATUS: This project is in the conceptual stage at this time.

PROJECT PROPONENT: DFG

D—026252

D-026252

PROJECT TITLE: HILLS FERRY SITE ACQUISITION (#28)

LOCATION: Confluence of the Merced and San Joaquin rivers.

BENEFITS: Secure the long term use of this site for the Hills Ferry Salmon Barrier to continue effective control of straying and reproductive losses above the Merced River confluence.

PROJECT DESCRIPTION: Wildlife Conservation Board has proceed on DFG's behalf to acquire this 10 acre parcel on the San Joaquin River. It is strategic in that the orientation of the annual migration barrier at this site has control undesirable straying of adult salmon. Placement of the barrier is subject to current landowner agreement on a year to year basis and "rent" is paid each year. The appraised value of the parcel was far less (approx. $60,000) the asking price. Under those conditions WCB cannot acquire the parcel. However, if another entity interested in the continuation of an effective fall barrier at this site could contribute the differential between a reasonable asking price and the appraised value then WCB could proceed to acquire the parcel. Partial funding is available now under a "4-Pumps" project.

ESTIMATED COST: $60,000

STATUS: Pending resolution of funding differential, DFG negotiates access to the site on a year to year basis.

PROJECT PROPONENT: DFG and DWR

D—026253

D-026253

PROJECT TITLE: EL SOLYO AND WEST STANISLAUS FISH SCREEN (#29) FEASIBILITY

LOCATION: San Joaquin River near Highway 132 Bridge

BENEFITS: Reduce or avoid juvenile salmonid impingement and entrapment mortality at these two riparian diversions from the lower San Joaquin river.

PROJECT DESCRIPTION: See Patterson Fish Screen Feasibility Project

ESTIMATED COST: $150,000

STATUS: This project is in the conceptual stage at this time.

PROJECT PROPONENT: DFG

D—026254

D-026254

PROJECT TITLE: REAL-TIME WQ MONITORING NETWORK (#30)

LOCATION: Lower San Joaquin River

BENEFITS: Improved understanding of system operations and real-time management of drainage to help meet water quality objectives.

PROJECT DESCRIPTION: See Real-time Water Quality Project Proposal and federal grant application.

ESTIMATED COST: $300,000

STATUS: The program is now operating at several key sites and the establishment and maintenance of additional telemetered monitoring sites would further enhance the utility of this water and water quality management effort. See DWR San Joaquin District.

PROJECT PROPONENT: DWR, SJRMP Action Team

D—0 2 6 2 5 5

D-026255

PROJECT TITLE: RESOURCES EDUCATION PROGRAM (#31)

LOCATION: San Joaquin Basin

BENEFITS: A more informed public that understands resource management issue

PROJECT DESCRIPTION: Integration and active implementation of Project Wild, Adopt a Watershed, Salmonids In The Classroom and many other programs throughout the San Joaquin Basin for grades K-12.

ESTIMATED COST: $200,000

STATUS: This project is in the conceptual stage at this time.

PROJECT PROPONENT: DFG

D—026256

D-026256

PROJECT TITLE: HATCHERY FISH MARKING PROGRAM (#32)

LOCATION: Merced River Hatchery and Tuolumne River Facility

BENEFITS: Distinctive external identification of hatchery origin fish allows for selective harvest in inland waters, estimates of hatchery contributions rates (sport, commercial, escapements, survival rate indices etc.) and clarifies evaluations of the benefits of restoration measures to natural production. Distinctive marks may also assist in specific mating strategies at basin hatcheries.

PROJECT DESCRIPTION: Purchase five (5) new Mark IV Coded-wire Tagging Machines, a heated tagging trailer, necessary replacement parts and supplies for use in the San Joaquin basin.

ESTIMATED COST: $130,000

STATUS: A proposal was prepared by DFG and submitted to several parties this winter while the opportunity for a substantial savings ($25,000 rebate offer) existed. That window of opportunity has now passed. Some other mechanism will now be required to meet the large and growing Delta tagging requests for spring 1997. Beyond 1997, upgrading existing DFG tagging equipment in conjunction with other service DFG provides when spearheading tagging efforts make this a cost-effective approach.

PROJECT PROPONENT: DFG

D—026257

D-026257

PROJECT TITLE: SMALL DIVERSION FISH SCREEN REPLACEMENT PROJECT (#33)

LOCATION: Nursery areas in the Merced, Tuolumne and Stanislaus rivers.

BENEFITS: Reduce or avoid juvenile salmonid impingement and entrapment mortality small pump riparian diversion in the designated salmon spawning areas.

PROJECT DESCRIPTION: In conjunction with the operation of DFG's San Joaquin Basin Habitat Shop and crew, a mechanism to provide funding to purchase, install and maintain off-the-shelf type fish screens on priority diversion is proposed. A survey is near completion documenting the locations, size and characteristics of all such diversions in the basin. The next phase of this work will identify priority diversions needing screens. Contacts and agreements with appropriate diverters will be pursued if funding is available. This process would be much more cost effective (less administrative time) on a basin-wide scale rather than seeking funding for each small screens on a project by project basis. A regular program providing DFG access to funds ($500,000 over fiver years) for acquisition, maintenance, repair or replacement of these screen would help facilitate this proactive program. DFG staff would be assigned to check the screens regularly and work with the landowners pursuant to DFG authorities and policies. Longer term funding to maintain and replace these unit would be necessary.

ESTIMATED COST: $500,000

STATUS: This project is in the conceptual stage at this time.

PROJECT PROPONENT: DFG

D—026258

D-026258

PROJECT TITLE: ADULT SALMON COUNTING STRUCTURES (#34)

LOCATION: Lower Stanislaus, Tuolumne and Merced rivers

BENEFITS: More accurate indices of adult salmon abundance

PROJECT DESCRIPTION: Installation, operation and removal of counting weirs on the three San Joaquin tributaries may provide more accurate information on spawning escapements that current methodologies. Some field sampling of carcasses and redd distribution would need to continue in addition to the proposed new effort with weir counts. There may also be a period where weir counts and mark-recapture estimates of escapement would both be performed to ensure the historical data will remain useful.

ESTIMATED COST: $300,000

STATUS: This proposal is in the conceptual phase at this time.

PROJECT PROPONENT: M/TID

D—026259

D-026259

PROJECT TITLE: BASSO BRIDGE RIPARIAN ACQUISITION/MGT/EDUCATION PROJECT (#35)

PROBLEM ADDRESSED: See Land Acquisition Evaluation (LAE)

BENEFITS: See LAE

PROJECT DESCRIPTION: See LAE

ESTIMATED COSTS: $350,000

STATUS: Final rating by the DFG Lands Committee and the DFG Leadership Team pending. Following this and the identification of funding for real estate activities and purchase, this project can proceed. Discussion with Stanislaus County is underway regarding compatible management of in-holdings and County properties. Early indications are positive.

PROJECT PROPONENT: DFG

D—026260

D-026260

PROJECT TITLE: SPAWNING GRAVEL INTRODUCTION, TUOLUMNE RIVER NEAR LAGRANGE (#36)

Project Location: Tuolumne River, from Old LaGrange Bridge (river mile 50.5) downstream to the New LaGrange Bridge (river mile 49.9), approximately 29 miles east of Modesto near LaGrange (LaGrange quadrangle).

Problem Addressed: Construction of LaGrange Dam in 1893 at river mile 52 permanently ended coarse sediment supply (gravels/cobbles) from the Tuolumne River watershed upstream of the town of LaGrange. Because the few tributaries entering the Tuolumne River downstream of LaGrange contribute virtually no coarse sediment, sediment transported during high flows has been obtained from the bed itself and limited floodplain deposits (dredger tailings). Further reduction in flood event magnitude, duration, and frequency after completion of New Don Pedro Dam in 1969 eliminated recruitment of floodplain deposits. Gravels and cobbles form the bed and banks of the stream, which is the habitat used by salmonids and other species. Elimination of upstream supply has caused channel incision in some locations, and bed particle coarsening in the primary spawning reach near LaGrange. Not only has this condition degraded salmonid habitat, but reduced the volume and extent of gravel deposits. Furthermore, a sand pit located in the lower portion of the Gasburg Creek watershed contributes a considerable quantity of fine sediment (sand) into the Tuolumne River near LaGrange, which has significantly reduced the quality of spawning habitat. In summary, the coarse sediment supply critical for salmonid habitat has been eliminated, and the fine sediment supply that is damaging to salmonid habitat has increased (relative to mainstem flows).

Project Description: We propose to restore a coarse sediment supply to the Tuolumne River below LaGrange Dam by artificially placing clean gravels into the stream between the Old and New LaGrange bridges. These gravels will be slightly smaller than the gravels on the currently paved bed surface such that the contemporary flow regime can transport these gravels and salmonids can better utilize them. This project assumes particle mobility, and we plan/depend on particles mobilizing, depositing as bars and spawning deposits, remobilizing, and redepositing over time. Routing these gravels downstream will provide a long project life span. The source of gravel is the sand pit adjacent to the proposed introduction site, which has been accumulating gravels as a byproduct of the sand extraction. Because this sand pit contributes to the fine sediment load in the Tuolumne River, it is further proposed as part of this project that the sand pit be regraded so that surface runoff from the sand pit flows into a sedimentation pond rather than into Gasburg Creek and the Tuolumne River.

Benefits: A majority of salmonid spawning and rearing in the Tuolumne River occurs in this reach; therefore, restoring a clean coarse bedload source will not only improve existing spawning/rearing habitat, it will increase the size and extent of habitat features. Restoring a bedload supply will encourage point bars and in-channel bar features to form, increasing channel and habitat complexity. We propose to introduce gravels at a rate equal to that of mainstem transport, so that the coarse sediment balance is restored.

Estimated Costs: The majority of costs will be the purchase, screening, and transportation/placement of these gravels, which depends on the volume of gravels needed. Because the mainstem transport varies from year to year, the gravel introduction volume will vary accordingly. Mainstem transport rates as a function of discharge, and then as a function of each year from 1970-96 is being computed, and is not yet complete. Assuming that a long-term average of 10,000 tons (approx. 6,200 yd^3) of gravel are introduced per year (a conservatively large estimate), the yearly cost would be approximately $90,000 per year. Add $15,000 for first year permitting costs, and $50,000 for regrading the sand pit.

Status: Owner of source material has been contacted and has provided cost estimate for supplying gravel. Volume of gravel on site will be quantified to determine life span of gravel source. Mainstem Tuolumne River gravel transport rates are being computed to estimate yearly introduction needs (introduction=transport). No environmental documentation has occurred to date.

Project Proponent: Tuolumne River Technical Advisory Committee (Don Pedro Project, FERC License No. 2299), participants include: Bay Area Water Users Association, California Department of Fish and Game, City and County of San Francisco, Friends of the Tuolumne Trust, Modesto Irrigation District, Tuolumne River Preservation Trust, Turlock Irrigation District, US Fish and Wildlife Service.

PROJECT TITLE: TUOLUMNE RIVER FLOW ENHANCEMENT FEASIBILITY STUDY (#37)

PROJECT LOCATION: Tuolumne River from La Grange Powerhouse (river mile 52) downstream to a diversion between river miles 19 and 27.

PROBLEM ADDRESSED: The project is to review the feasibility of providing supplemental flows in a portion of the Tuolumne River through deliveries of Turlock Irrigation District water to a proposed domestic water treatment plant and partial deliveries to meet irrigation needs. These flows would supplement the releases already ordered by FERC in 1996. Water for these purposes would normally be diverted into the Turlock Irrigation District Upper Main Canal at La Grange.

PROJECT DESCRIPTION: The project would be a feasibility study for providing supplemental La Grange instream flows with a diversion system having the following components:

1. A channel, or other type of diversion, from the main stem of the river to the proposed pumping plant,
2. A screened pump intake structure,
3. A pumping plant with separate pumps delivering water to both the domestic water plant and the Ceres Main Canal,
4. Flow monitoring for the pumping plant,
5. Develop long term O & M cost projections to determine potential incentive price structure.

BENEFITS: The principle benefit of the project is to provide additional flows in the upper reach of the Tuolumne River during the summer months of below average runoff years. The domestic water flows are estimated to be up to 25 cfs year round. The irrigation flows could range from 25 cfs to 100 cfs, depending on costs. This would provide up to 125 cfs of additional water in the river between La Grange and the diversion site.

ESTIMATED COSTS: The feasibility study is estimated to cost $100,000.

STATUS: This is the first step in complying with Section 11 paragraphs 5 and 6 in the Don Pedro FERC Settlement Agreement.

PROJECT PROPONENT: The Tuolumne River Technical Advisory Committee (Don Pedro Project, FERC License No. 2299); participants include: Turlock Irrigation District, Modesto Irrigation District, California Department of Fish and Game, City and County of San Francisco, and U.S. Fish and Wildlife Service.

D—026262

D-026262

PROJECT DESCRIPTION: TUOLUMNE RIVER ENVIRONMENTAL EDUCATION CENTER (#38)

Project Location - LaGrange, Stanislaus County

Problem Addressed: The Tuolumne River Environmental Education Center will be designed to address fisheries (both commercial and angling), fish and wildlife, agriculture, habitats, water, electrical power and people. The general public awareness and understanding of the necessity for an ecosystem approach to water, fish and wildlife management and the values of those issues to overall quality of human life and the economy need to be enhanced. Overall public support for environmental protection and the maintenance of environmental quality will be improved only through education and understanding. This environmental education center can address many of the interrelated environmental issues of the San Joaquin River watershed, including salmon genetics, ecosystems, watershed management, water, power agriculture and human social and economic issues and challenges. Business is no longer as usual. A healthy business depends upon a healthy environment and a healthy environment depends upon a healthy economy.

The most efficient and cost effective way to minimize environmental damages is to prevent them initially. High quality environmental values and the financial and intellectual support to maintain them can only come from an educated public. Many of the issues we face today in the Sacramento and San Joaquin River watersheds, Bay-Delta, and other regional watersheds, may be resolved or improved with an elevated public understanding and awareness. An integrated environmental education program, of which this project would be part, is necessary to help accomplish that goal.

Benefits: This environmental education project is related to the San Joaquin River Parkway Plan; the Tuolumne River Regional Park Plan; Bear Creek Conservation and Trust Grassland Environmental Education Center; Knights Ferry Visitor Center; Great Valley Museum; Coles Levee Ecosystem Preserve Environmental Education Center, and the San Joaquin River Management Program (SJRMP) Education Program.

Benefits from an environmental education program are difficult to quantify. However, environmental education is basic to understanding of the human environment and its interrelationships. Environmental education can result in less environmental damage, less habitat degradation from fires, littering, solid waste disposal, fewer angling and poaching violations, increased volunteerism for riparian habitat and fish and wildlife enhancement projects, and financial support for those types of projects. Environmental education increases the number of land use improvements and habitat enhancement projects along riparian corridors, as evidenced by CRMP, the Coordinator Resource Management Programs being implemented along a number of California streams. These programs are being developed largely as the result of self-education at the local level.

Project Description: The Tuolumne River Environmental Education Center at LaGrange is to be located on the site of the Tuolumne River fish hatchery. This center is to be central to the development of an overall environmental education and outreach program for the tributaries of the San Joaquin River and will be integrated with the San Joaquin River Program yet to be developed under SJRMP. The project will be phased into four parts: Phase I, Land Acquisition; Phase II, the development of a Master Site Plan with public input, Construction (Phase III) and operations (Phase IV).

The environmental education enter would serve both local publics as well as include a public outreach program which could be integrated with education activities on both the main-stream San Joaquin River and other tributaries.

Development of the Master Plan in Phase II is intended to include:

(a) Public use
(b) Natural resource values
(c) Economic values
(d) Natural trail design
(e) Interpretive exhibits/buildings
(f) Parking and access - included for the physically challenged
(g) Picnic area

(h) Native American Indian display
(i) Habitat restoration, as necessary around the facilities.

Phase II also includes the intermediate and final phases of the environmental documentation. Phase III would be the construction phase under contract and Phase IV, the operating Phase. Although to be operated under the auspices of the California Department of Fish and Game, the Center may actually be operated by a contractor or a locally established natural history association. Volunteers and others would plan to be used in the operations of the facility on a daily basis.

Estimated Costs: Potential cost-share partners could include the U.S. Bureau of Reclamation, the U.S. Fish and Wildlife Service, the Turlock Irrigation District and the Tuolumne River Conservancy or other similar grass-roots public non-profit support group (yet to be established?). Estimated costs, time frames and status are shown in Part VI below.

Status: The land acquisition has been completed. About 3.6 acres were purchased which includes area for the development of a hatchery. The environmental documentation can either be integrated with that being developed for the fish hatchery or can be handled separately. Public meetings on the hatchery have already been initiated. Likely, however, the simplest approach would be the development of a concurrent process for the education center, which is not dependent upon the timing of the hatchery plans, approval, or construction. Although related to the hatchery and artificial fish production, the environmental education center can be a stand alone project. The expense of the project depends upon the development of the Master Plan and overall funding availability. Interpretive buildings could either be constructed, or modular construction could be used instead, which would be less expensive, although perhaps not as durable.

Phase	Activity	Time (Months)	Cost ($)
Phase I	Land Acquisition	Completed	
Phase II	Master Plan	6	35K
	Environmental Documentation	12	20K
Phase III	Construction: Interpretive Center Gazebo Nature Trail	14	 75K 15K 8K
Phase IV	Operations/maintenance	Ongoing	40K/yr.

Project Proponent: California Department of Fish and Game, 1234 East Shaw Avenue,Fresno, CA 93710.
Contact: Rhonda Reed or Bill Loudermilk
Phone No.: 209-243-4017 or 209-222-3761, respectively

D—026264

D-026264

PROJECT TITLE: RIPARIAN HABITAT RESTORATION, TUOLUMNE RIVER NEAR LAGRANGE (#39)

LOCATION: Tuolumne River, from New LaGrange Bridge (river mile 49.9) downstream to Old Basso Bridge (river mile 47.4), approximately 29 miles east of Modesto near LaGrange (USGS "LaGrange" quadrangle).

PROBLEM ADDRESSED: Extensive (valley wall to valley wall) gold dredging occurred until 1937, leaving no defined channel and voluminous piles of dredger tailings (as shown on 1937 aerial photos). Flood events after 1937 began reforming a defined channel through the tailings, but by 1963 the channel still lacked defined floodplains and meander sequences. Then, during construction of New Don Pedro Dam from 1965 to 1969, the dredger tailings were removed, leaving shallow ponds and uneven surfaces. Shortly after completion of the dam, the river channel from river mile 50.5 to 46.6 was reconstructed to optimize spawning habitat. However, the riparian community was not restored, and limited natural recruitment has occurred over the years. Since 1972, the project site has been extensively grazed, preventing natural recruitment of valley oak and cottonwoods. White alder and narrow leaf willow, however, have encroached on the channel and point bars. This land use legacy has resulted in fragmented riparian stands, poor to non-existent valley oak regeneration, and shallow ponds that often strand salmonids during receding high flow events.

PROJECT DESCRIPTION: We propose the following:

1. Recreate functional floodplains and terraces that are inundated during appropriate post-dam floods
2. Resurface floodplains and terraces with finer sediments conducive to riparian initiation
3. Reestablishing cottonwood communities on floodplain surfaces and valley oak communities on terrace surfaces
4. Regrade floodplain and terrace surfaces to reduce salmonid fry stranding
5. Create high flow channels within the active channel to increase salmonid habitat diversity.

BENEFITS: Because a majority of salmonid spawning and rearing in the Tuolumne River occurs in this reach, filling/regrading shallow ponds on floodplain surfaces will reduce fry and juvenile salmonid stranding on the receding limb of high flow events. Reestablishing functional floodplains, and eliminating grazing on restored surfaces, will restore natural riparian woody plant initiation, which will increase the structural, age, and species diversity of the riparian community. The mature valley oak and cottonwood communities were historically responsible for providing much of the large woody debris input into the channel, providing direct (cover) and indirect (particle sorting for spawning and rearing) habitat for salmonids. Since the mature (pre-dam) oaks and cottonwoods are limited in the reach, restoring these communities will provide future woody debris input and will increase riparian vegetation structural diversity. Greater canopy structural diversity will increase perch availability for Blue Heron, Great Egrets, Osprey, and Bald Eagles. Restoration of larger cottonwood and valley oak stands (> 10 acres) will also serve to create beneficial microclimatic conditions (cooler temperatures and higher humidity) for small mammals and amphibians.

ESTIMATED COST: Engineering, environmental documentation/permitting, construction, revegetation, plant stock, and monitoring (for 5 years) costs are approximately $275,000. Cost sharing is being pursued.

STATUS: A rough draft of the restoration design will be completed by 25 January 1997. Complete engineering design and survey work will be completed by October 1997, pending funding. The implementation of the design including construction, revegetation and monitoring will begin in June of 1998. No environmental documentation has occurred to date.

PROJECT PROPONENT: Tuolumne River Technical Advisory Committee (Don Pedro Project, FERC License No. 2299), participants include: Bay Area Water Users Association, California Department of Fish and Game, City and County of San Francisco, Friends of the Tuolumne Trust, Modesto Irrigation District, Tuolumne River Preservation Trust, Turlock Irrigation District, US Fish and Wildlife Service.

PROJECT TITLE: LOWER STANISLAUS RIVER TEMPERATURE MANAGEMENT FEASIBILITY STUDY (#40)

LOCATION: New Melones, Tulloch, and Goodwin reservoirs, and lower Stanislaus River to its confluence with San Joaquin River. Evaluations of the temperature effects of upstream projects and facilities (including Spicer Meadows Reservoir, Collierville Power Project, Angels-Utica Project, and Sand Bar Project) on the thermal regime of the lower Stanislaus River should be addressed as a separate feasibility study once the lower basin temperature management feasibility studies are completed. Integration of the results of any temperature model into a detailed salmon mortality model may also be contemplated as a future project once the feasibility studies have been completed.

BENEFITS: This project will provide information on the potential for improving natural habitat conditions for anadromous salmonids at critical periods of their riverine existence in a greater frequency of years. Improved spawning and incubation temperatures in the fall, as well as improved rearing temperatures in the spring and early summer of some years may be feasible by manipulating New Melones, Tulloch and Goodwin releases.

PROJECT DESCRIPTION: A daily reservoir model and a daily riverine temperature model will be applied to the lower Stanislaus River basin. This feasibility study should include two years of complete water temperature data from the three reservoirs and several lower river locations as well as site specific meteorological conditions over the same time period. These data will be used to calibrate separate reservoir and river temperature models for year round use. Model outputs will be integrated to allow prediction of daily reservoir release temperatures and daily stream temperatures in the lower Stanislaus River under a variety of simulated hydrologic, meteorologic, and New Melones Reservoir elevation conditions. These simulation conditions will need to be specified (or at least estimated) by intested resource agencies prior to initiation of any studies. Based upon these predicted temperature simulations, the feasibility of controlling lower Stanislaus River temperatures through the operation of the upstream dams will be determined. The resulting benefits/costs of any management actions can then be assessed by the interested parties.

ESTIMATED COST: $250,000

STATUS: The United States Bureau of Reclamation has completed a monthly temperature simulation that was based upon limited calibration data collection. The ability of this model to adequately predict even weekly temperature regimes on a year round basis has been questioned. While this USBR model remains the best available information for predicting stream temperatures in the lower Stanislaus River, a fully verified and reliable, daily, year round temperature model is preferred.

PROJECT PROPONENT: California Department of Fish and Game

D—026266

D-026266

PROJECT TITLE: EVALUATION OF ARCHIVED SCALE AND OTOLITH SAMPLES COLLECTED DURING FALL CHINOOK SALMON CARCASS SURVEYS ON SAN JOAQUIN TRIBUTARIES (#41)

LOCATION: Stanislaus, Tuolumne, and Merced River basins.

BENEFITS: This project will yield information on the age structure of past San Joaquin tributary fall chinook salmon spawning populations. This information could then be used to perform more precise cohort analyses for each of the basins. This project will not involve any field work or collection of any new samples, but will rely solely on the laboratory inspection and analysis of previously collected, but unexamined, biological materials.

PROJECT DESCRIPTION: The California Department of Fish and Game has been estimating spawning escapements for the San Joaquin River tributaries annually since 1951. Scale samples have been collected from chinook salmon carcasses during these surveys at least since 1976. Between the fall 1976 and 1990 surveys about 2100 scale samples were collected from the San Joaquin tributaries (Table 1). Additional (but unquantified) numbers of scales have been collected through the recently completed fall 1996 escapement surveys. Otoliths samples have been collected from some chinook salmon carcasses in all three tributaries since 1994. Scales samples collected prior to 1976 may exist and should be included for examination under this project.

Table 1. San Joaquin basin fall-run chinook salmon scale samples, 1976-1996 (from DFG)

Year	Stanislaus River	Tuolumne River	Merced River
1976	0	0	41
1981	0	140	31
1982	0	40	0
1983	4	52	20
1984	0	57	0
1985	8	77	3
1986	0	65	0
1987	159	85	8
1988	239	66	38
1989	481	365	100
1990	17	31	13
1991	0	?	?
1992	0	?	?
1993	?	?	?
1994*	?	?	?
1995*	?	?	?
1996*	?	?	?

* otoliths collected

This project will initially involve locating the archived materials and cataloging individual samples (including sample date, sample location, size of fish from which sample was collected). Samples will then be prepared and examined using available computer hardware and pattern-analysis software. Scale circuli patterns (or ring patterns in otoliths) will be used to yield an age estimate for each sample examined. Collectively, samples from a given year and basin should yield estimates for the age structure for that particular spawning escapement of chinook salmon. All results will be tabulated and presented in a final report. Depending on the amount of material available for examination, it is expected that this project will take 12 to 18 months to complete.

ESTIMATED COST: $45,000

STATUS: The scale, and more recently otolith, samples have been routinely collected from salmon carcasses during annual fall spawning surveys in each of the tributaries. Most of this material has been archived by the Department pending funding for future examination.

PROJECT PROPONENT: California Department of Fish and Game

D—026267

D-026267

PROJECT TITLE: STANISLAUS WATERSHED PROJECTS TO IMPROVE WATER QUALITY FOR FISHERIES: PROPOSAL FOR FUNDING OF THE EAST STANISLAUS RCD (#42)

PROJECT LOCATION: Stanislaus Basin Watershed, Stanislaus County

PROBLEM ADDRESSED: Poor quality water runoff from ranch and farm land has negative impacts on salmon fisheries in numerous rivers and streams. Sands and fines clog gravel beds and can bury and smother salmon eggs. Sediment load negatively affects that shape and character of river stream channels and decreases the quality of in-stream habitat for salmon fry and smolts. When the weather is warmer, fine sediments add to the increase in water temperature because it allows more heat absorption from sunlight. Fishery studies to date indicate that poor quality water hurts salmon eggs and young in the Stanislaus River. Though the impacts are not statistically identified, decreases in water quality as measured in dissolved oxygen, temperature and toxic chemicals may be a major factor in the demise of smolts and fry living in and migrating from the river. Gaining additional knowledge on how on-farm/ranch management practices and infrastructure in the ESRCD can improve the quality of the water that enters the Stanislaus River can be beneficial to similar watersheds around the state.

PROJECT DESCRIPTION: The East Stanislaus Resource Conservation District (ESRCD) seeks assistance in boosting the incorporation of farming and ranching practices that improve the quality of water running off of Stanislaus watershed lands. During the first 2-3 months of the project, a professional facilitator will help the stakeholders clarify and prioritize goals, strategies and objectives, and develop a two year work plan. Based on this, the ESRCD will contract a resource conservation specialist who will help develop evaluative procedures and criteria for selecting pilot projects, developing the monitoring program and writing documentation and analysis. In addition this person would work with the RCD and NRCS to help acquire additional funds and involve ranchers and farmers into the program. On-farm/ranch pilot projects which would be considered for funding include but are not limited to: sediment retention basins, vegetative filters, tailwater return systems, dormant spray reduction practices and grazing management improvements. Pilot projects will incorporate different levels of monitoring to evaluate the replicability and success of the different practices. Monitoring, professional facilitation and other components maybe contracted to consultants and universities.

BENEFITS: An initial investment in a planning, pilot project and monitoring program for the ESRCD can provide synergistic benefits for water quality in the Stanislaus. There are a number of USDA, USEPA and other programs such as the Environmental Quality Incentive Program which are authorized to provide cost sharing and other funds to the area but cannot be accessed without this type of project being done. Because much of the sediments and chemicals entering the Stanislaus River comes from ranch and farm runoff, changes in practices which improve ranch and farm runoff could, over time, significantly improve the quality of the water for Stanislaus fisheries. In addition, these pilot projects will provide important information for other RCDs which have similar problems and as they provide the ESRCD with guidance for future work.

ESTIMATED COSTS: The proposed costs will be divided between planning, logistics, monitoring, and pilot projects. $20,000 would pay for the process facilitator for the three year effort and for the logistical work to set the project up. $130,000 would pay for three years of a resource conservationist to provide technical help, project supervision, accounting, reporting, and grant writing. $350,000 would be available for pilot project implementation. A final $50,000 would be used for the initial baseline monitoring and three years of follow up monitoring and reports.

STATUS: The East Stanislaus County RCD may voted to support this project at its February 5 meeting and is committed to implement it as soon as funding is approved.

PROJECT TITLE: STANISLAUS RIVER TEMPERATURE MODELING AND REAL TIME OPERATION DEVELOPMENT DRAFT 2 (#43)

PROJECT LOCATION: New Melones, Tullock and Goodwin reservoirs and the mainstem Stanislaus River downstream.

PROBLEM ADDRESSED: Experience gained during the last drought showed that when the New Melones reservoir drops to a level near the elevation of the power outlets and the top of the Old Melones dam, the temperature of the released water can be too warm for salmon egg survival and might also contribute to temperature related problems of fry and smolt. One option being considered in the long-term operations of the New Melones dam is a more risk assuming, conjunctive use focused, operational model whereby reservoir levels statistically drop to this critical level and below more often. Changing operations in this manner will result in less reservoir flood spills. This will help fisheries because spills that occur before smolt outmigration can harm salmon fry and eggs. In addition, fewer spills equate to an increase in annual yield (preliminary estimates are at least 30,000 acre feet annually) which means more water will be available for all project purposes. If the temperature problem at New Melones is not addressed, this management option cannot be properly considered.

PROJECT DESCRIPTION: Developing an operational method that ensures critical fishery temperature needs can be met in the Stanislaus River requires four separate but integrated projects. 1. A temperature model for the river below Goodwin dam that accurately predicts how reservoir outflows and temperature can be best integrated to improve in-stream temperatures as the water flows toward its confluence with the San Joaquin. This model would account for air, groundwater and surface water inflow temperatures at key points along the river. Ideally the integration of stream and reservoir temperatures with the biology of the fishery as modeled in the IFIM (PHABSIM) would lead to the creation of a useful real-time monitoring program similar and possibly integrated into the agencies successful water quality real-time monitoring program. Thus a river temperature model on the Stanislaus could become an important restoration management tool in its own right. To make this project an truly useful tool, an analysis will need to be done on the existing monitoring stations and the information they provide. For example, one gauge is within two miles of a major water district return flow site which causes artificially large fluctuations in river temperatures downstream. 2. A reservoir operations temperature model that works in coordination with the river temperature model. The Bureau of Reclamation learned a great deal during the last drought on how operations of New Melones at a critically low level affected downstream river temperatures. For example, they calculated the value of lowering downstream Tullock and Goodwin reservoirs so that the water flowed through them more quickly, and thus at a colder temperature to the river below. The existing USBR modeling work along with additional data and the river temperature model need to be used to fully determine how best to operate New Melones for the most efficient means of meeting downstream water temperature needs. This would be critical to the development of real-time monitoring and operations as a restoration tool. 3. The integration of the two models and an analysis of the value of real-time monitoring. If the integration of the two models is done correctly, whenever real time modeling detects a problem, the models can help identify the cause and the best solution to fix it. The cost of real timemonitoring is mostly dependent on the cost of collecting the data from the stations along the river and the improvement of monitoring in

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general along the river. The majority of the initial costs are investments in the information infrastructure - computer programming, webpage development and monitoring station remote sending hardware. The ongoing costs of webpage maintenance and modeling adjustments are minor and can be incorporated into job descriptions of existing personnel. 4. Feasibility studies into the most cost-effective alternatives to rectify the problem of the Old Melones dam and the high elevation powerhouse intake. A number of long term solutions have been proposed. Determine the total b.t.u.s that would need to be removed via in-river refrigeration units to get the right temperature of water in each of the different model runs. Blow a notch in Old Melones dam so that the reverse temperature curtain effect is eliminated. Put a siphon from the cold side over the old dam directly into the outlet tubes at the base of New Melones. The value of all the different alternatives will be easier to interpret with the solid base of modeling done in steps 1-3. From this information initial costs estimates could be made on these different alternatives. What is eventually needed is a full-feasibility study on a preferred alternative.

BENEFITS: The completion of these four projects will: 1. Develop a temperature model for the river and the dam that assists in a reservoir operational plan that makes the most efficient use of water to meet the temperature needs of anadromous fish. 2. Lead to the development of a preferred alternative for any infrastructure changes needed by the long term solution to the problems of flow, reservoir levels, and fishery temperature needs. 3. Solve the problem that not completing these models creates for fully evaluating an EIS/EIR alternative that maximizes the goals of spill avoidance, conjunctive-use and fishery protection for New Melones operations.

ESTIMATED COSTS (total guesses)
River Temperature Model: $100,000
Reservoir Temperature Model: $150,000
Integration Modeling: $50,000
Feasibility Study: $75,000
Process facilitation and logistics*: $10,000(*a committee of the Stanislaus Basin Stakeholders)

Total: $385,000

STATUS: Consensus on the importance of temperature modeling has been reached by the stakeholders. Details have not been worked out but could be quickly if funding was possible.

PROJECT PROPONENT: The Stanislaus Basin Stakeholders are the project proponents.

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PROJECT TITLE: STANISLAUS CHANNEL AND FLOOD PLAIN MAINTENANCE POLICY AND PLANNING (#44)

PROJECT LOCATION: Stanislaus River from Goodwin Dam to the San Joaquin

PROBLEM ADDRESSED: The fishery biologists at the January 16-17 CalFed sponsored workshop agreed that the quality of the Stanislaus River channel and flood plain has an impact on the survival of salmon eggs, fry and smolt. The Army Corps of Engineers has a mandate to make recreation, and flood protection along with habitat restoration priority goals for the Stanislaus channel and flood plain. The actions taken to achieve one of these goals can have negative impacts on the other goals. For example, structural changes to spawning areas whether through gravel and boulder placement or bulldozer manipulation may benefit the fishery but impose problems for recreation. Restricting the river channel may benefit flood protection but hurt juvenile rearing habitat. Woody debris in the river can provide additional habitat but can also be a navigational hazard. Even the methods for riparian vegetation restoration can be controversial depending on chemical usage and its impacts on the water quality for juveniles, especially when they are in the near shore environment during spraying times. Each of these issues can have significant impact on spawning beds, fry and smolt rearing habitat, outmigration success, predator prevention, water temperature and water quality. Developing interest-based solutions to these problems would likely lead to greater consensus on restoration projects, policy development, and a long-term vision of the river.

PROJECT DESCRIPTION: We propose to pursue a stakeholder-based process through which new policies, guidelines and strategies can be developed which will improve the quality of the river channel and flood plain for anadromous fish while at the same time meet existing goals and interests. In this one year project, the first two meetings will be spent identifying and inviting the different stakeholders, clarifying their goals and interests, understanding issues, and providing input into the process. The next two - three meetings will provide the stakeholders with an opportunity to help develop and analyze different alternatives which can help advance their mutual goals. In the last two meetings, the participants will advance new policies, restoration proposals, and other actions as proposals for implementation. Some of the proposed solutions will take no additional funds, only changes in policies and practices. Others might lead to consensus-based requests for funding habitat improvement and channel and flood plain maintenance and restoration projects.

BENEFITS: If successful, this project will lead to a new level of cooperation between agencies committed to improving the fishery habitat of the Stanislaus River and those mandated to enhance recreation and flood protection. New guidelines and policies will result in improvements in existing practices. A consensus on restoration and habitat improvement projects will lead to more successful implementation as well as improving the chances that restoration projects would receive funding.

ESTIMATED COSTS: The proposed costs will primarily go to meeting facilitation and logistics. Stakeholders will voluntarily participate. Facilitation, pre-meeting conferencing and agenda distribution, minutes circulation and travel for six bi-monthly meetings are budgeted for$10,000. Copying, mail, and phone will account for an additional $1000.

STATUS: This project can be implemented immediately.

PROJECT PROPONENT: The Stanislaus Basin Stakeholders are the project proponents.

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PROJECT TITLE: KNIGHTS FERRY GRAVEL REPLENISHMENT (#45)

LOCATION: Stanislaus River between Knights Ferry and the Orange Blossom Bridge.

BENEFITS: To improve spawning and incubation habitat for fall-run chinook salmon in the primary spawning reach, where two studies indicate that many riffles are heavily silted and intragravel dissolved oxygen levels are often low. Rather than attempting to clean the existing gravel, clean gravel would be added to the streambed to minimize both cost and potential problems with streambed instability. This project and the Goodwin Canyon Gravel Replenishment Project are complimentary, since they would attempt to correct two completely different problems. Goodwin Canyon does not have a sedimentation problem but gravel is scarce probably because of the high gradient, confined nature of the streambed. Conversely, there is plenty of gravel downstream from Knights Ferry, however suspended sediment concentrations are high during rain storms and may gradually reduce the suitability of the new gravel. Both projects may be necessary to restore the chinook salmon population in the Stanislaus River, which was estimated at only 168 fish in fall 1996.

Another benefit of this project would be to evaluate whether spawning is affected by the type of gravel added and whether the gravel can be stabilized for longer use. Gravel added to the Merced River in 1996 was used immediately by spawners but gravel added to the Stanislaus River at the Horseshoe Road Recreation Area in 1994 was used by very few spawners during the first three years. This project will evaluate whether spawner use depends on the (1) source of gravel, (2) whether river rock (rounded) or cracked rock is used, and (3) whether most of the substrate between 1/8 inch and inch is washed from the gravel mixture. In another evaluation, the effect of adding large boulders will be tested to determine whether gravel stability is improved. Boulder weirs were not effective at the Horseshoe Road sites. Concerns with flooding and rafting safety preclude more aggressive methods of stabilizing gravels in the Stanislaus River.

PROJECT DESCRIPTION: At 15 of the 45 natural riffles between Knights Ferry and Orange Blossom Bridge, approximately 220 cubic yards (300 tons) of gravel will be added to the streambed just upstream of each riffle. These areas tend to maximize downwelling of surface flow into the gravel, which enhances egg survival, and they are natural depositional areas that should maximize stability. Three riffles will be selected for each of 5 gravel types. Three control riffles will receive river rock from the Stanislaus floodplain of which 90% consists of a uniform mixture of 1/8 to 4 inch rock and 10% 4 to 6 inch rock. Three test riffles will receive river rock that does not come from the Stanislaus. Three other test riffles will receive cracked Stanislaus rock. Another three test riffles will receive Stanislaus rock that contains only 10% rock between 1/8 and inch. The last three test riffles will have two to three foot diameter boulders interspersed through the new Stanislaus gravel to increase stability. Rock will be added using a conveyor belt to minimize disturbance to the river bank and streambed. Gravel will be added to a maximum depth of 2 feet and streambed elevation will not be raised above the crest of the natural riffle. Access points will be revegetated if necessary. Monitoring is described in a separate project.

ESTIMATED COST: $260,000

STATUS: This project is in the conceptual stage, but could be implemented in 1997.

PROJECT PROPONENTS: The Stockton East Water District, U.S. Army Corps of Engineers, and Stanislaus River Parks.

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PROJECT TITLE: KNIGHTS FERRY GRAVEL MONITORING (#46)

LOCATION: Stanislaus River between Knights Ferry and the Orange Blossom Bridge.

BENEFITS: To monitor the gravel replenishment project in terms of 1) use by spawners; 2) gravel stability, and 3) suitability for incubating eggs. The 1994 spawning habitat projects at the Horseshoe Road Recreation Area were poorly used by spawners and were not very stable. To investigate methods of improving the use and stability of gravel replenishment projects, five types of gravel will be tested at 15 riffles in the project reach. Monitoring will determine which type(s) of gravel are preferred by spawners and whether adding boulders or using round river rock affects project stability. Monitoring the suitability for incubating eggs is also important since suspended sediment concentration is high in the project area during rain storms, which are frequent during the incubation period for fall-run chinook salmon. Studies have shown that the impact of suspended sediment on intragravel dissolved oxygen concentration (i.e., egg survival) is greatly reduced in riffles that have low sand concentrations. This monitoring project will evaluate whether different mixtures of gravel sizes affect the impact of suspended sediment.

PROJECT DESCRIPTION: At each of the 15 project riffles, streambed stability, spawner use, and intragravel water quality will be monitored for three years. To monitor streambed stability, streambed elevations will be measured along 20 transects interspersed between the upstream end of the new gravel bed to the downstream end of the existing riffle. Streambed measurements will be made immediately prior to gravel addition and immediately thereafter. Additional streambed measurements will be made approximately 12 and 24 months after the gravel has been added. To monitor spawner use each year, project riffles will be surveyed for redds at 10-day intervals from October 20 through December 20. To monitor intragravel water quality at each of the 15 project riffles each year, piezometers will be installed in artificial redds (no eggs) at three sites in the newly added gravel and at three sites in the existing riffle. Indices of downwelling of surface water will include measurements of vertical hydraulic gradient and differences in temperature between surface and intragravel water. Vertical hydraulic gradient and intragravel dissolved oxygen concentrations will be measured at each of the 90 piezometers at 10-day intervals from October 20 to December 31 and on January 31. Differences in temperature between surface and intragravel water will be monitored with thermographs recording at 30-minute intervals between October 20 to January 31. One thermograph will be buried with each of the 90 piezometers. Piezometer sites will be characterized by local streambed gradient, water depth, and velocity.

ESTIMATED COST: $60,000 the first year and $40,000 for each of the second and third years. If the project riffles are still functioning after three years, then monitoring should be continued for another three year period.

STATUS: This project could be implemented in 1997.

PROJECT PROPONENTS: The Stockton East Water District, U.S. Army Corps of Engineers, and Stanislaus River Parks.

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PROJECT TITLE: RIPARIAN HABITAT RESTORATION, STANISLAUS RIVER (#47)

PROJECT LOCATION: Approximately 20 acres along the Stanislaus River, primarily near Lovers Leap Recreation Area and other locations between Goodwin Dam and Oakdale.

BENEFITS: Although there is a superficial appearance of a lush and healthy riparian corridor along the Stanislaus River, there is little or no regeneration of native woody and herbaceous native riparian vegetation. Himalayan blackberry (Rubus procerus) is now widespread along the riverbanks and has outcompeted the native sedge, rush, herb, shrub and tree species that formerly occupied these mesic sites. On the floodplains and terraces, tree of heaven (Ailanthus altissima) has become widely naturalized and has displaced native alder, Fremont cottonwood, valley oak, and sycamore. Introduced annual grasses also dominate these upland sites and are inhibiting germination of native plant seeds in the soil.

Restoration of the native riparian vegetation, particularly cottonwoods, will ensure a supply of (1) large woody debris needed for channel maintenance processes and cover for juvenile fish, (2) organic input for fish food production, (3) soil stability to minimize sedimentation of spawning beds, and (4) shade that helps maintain suitable water temperatures. Channel maintenance processes and sedimentation are particularly important concerns, since the quality of salmon spawning habitat is quite poor in the Stanislaus River. In addition, an enhanced riparian plant community of many different life-forms (trees, shrubs, herbs, grasses and sedges) provides more wildlife benefits than does a simple shrub dominated blackberry thicket. The cottonwood zone of the riparian forest has the most complex architecture of any California vegetation, and the richest collection of animal species. More species of birds nest in this forest, for example, than in any other plant community.

PROJECT DESCRIPTION: A low-intensity, long-term vegetation management project will be implemented that repeatedly cuts blackberries, tree of heaven and annual grasses to gradually weaken and kill these exotic species while stimulating the natural regeneration of native species that lie dormant in riparian soils. This technique has been successfully used at the Cosumnes River Preserve, Traverse Creek on the Eldorado National Forest and Ringold and Hangtown Creeks in Placerville. This approach has the benefit of not aesthetically disrupting a recreational area, minimizing the risk of streambank erosion, and avoiding the adverse aquatic effects of herbicides.

Exotic species will be eliminated with four cuttings between spring and fall on approximately 20 acres to be designated by the U.S. Army Corps of Engineers. Blackberries will be removed using gas-powered hedge shears. Tree of heaven will be cut with chain saws and a weed eater will be used for cutting annual grasses. Native seedlings and seeds will not be disturbed. Cuttings should begin in early spring to maximize the likelihood that seeds of native species can successfully germinate and become established. If monitoring determines that natural regeneration of native species is unsuccessful, those areas will be seeded and/or planted with native species during winter. At the beginning of this project, all treated areas will be fenced to prevent livestock grazing. Changes in the distribution, abundance, and vigor of both native and exotic species will be monitored annually for five years.

ESTIMATED COST: The cost of exotic species removal is $30,000. Installation of fencing is $25,000. Monitoring costs are $5,000 per year for five years.

STATUS: This project is in the conceptual stage, but could be implemented in 1998.

PROJECT PROPONENTS: The U.S. Army Corps of Engineers, Stanislaus River Parks, Stockton East Water District, and the Stanislaus River Council.

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PROJECT TITLE: IMPROVING STANISLAUS RIVER ESCAPEMENT MONITORING-FEASIBILITY OF USING HYDROACOUSTICS (#48)

LOCATION: A hydroacoustic station will be tested in the Stanislaus River downstream of Riverbank to count adult fall-run chinook salmon.

BENEFITS: Monitoring when adult salmon return to the Stanislaus River to spawn, the age and sex of returning fish, and the total number that return provides a valuable means of evaluating the success of restoration efforts. The current DFG carcass surveys provide these data, but the accuracy of those estimates is uncertain, particularly for years when fall flows are high and boating is difficult. This project would test the feasibility of using hydroacoustic methods in conjunction with the DFG carcass surveys to provide accurate escapement estimates during all flows. DFG surveys would still be required to provide data on spawning distribution and the sex and age of spawners. The hydroacoustic methods may provide a cost effective alternative to installing counting weirs, which may not be effective at all flows.

PROJECT DESCRIPTION: This project would be conducted in two phases. The first phase would require a one week effort in October while spawning-level flows are released to locate a hydraulically suitable site for hydroacoustic monitoring. If a suitable site is located during the first phase, the second phase would compare hydroacoustic counts, visual counts, and the DFG escapement estimate. Hydroacoustic counts would be made during the entire migration period (October 25 to December 24). To verify the hydroacoustic counts, visual counts of at least 50 fish will be made at a nearby riffle. If necessary, a temporary weir will be installed to provide accurate visual counts in an area adjacent to the hydroacoustic station. The Phase II report would discuss whether the DFG carcass surveys are adequate, and if not, whether combined hydroacoustic counts and carcass surveys would be sufficient.

ESTIMATED COST: Phase I costs are $20,000. Phase II costs are $160,000, if a temporary counting weir is not needed. If a weir is necessary, then Phase II costs would increase by $50,000.

STATUS: This project could be implemented in 1997.

PROJECT PROPONENTS: The Stockton East Water District.

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PROJECT TITLE: VERIFICATION AND CALIBRATION OF SCREW-TRAP ESTIMATES OF JUVENILE SALMON MIGRANTS FROM THE STANISLAUS RIVER - FEASIBILITY OF USING HYDROACOUSTICS (#49)

LOCATION: Hydroacoustic stations will be established near the screw-trap sites at Oakdale and Caswell Park.

BENEFITS: Using screw traps to monitor the number of juvenile salmon migrants at Oakdale and Caswell Park provides the means to evaluate the collective effect of the restoration and management actions. Although screw-trap capture efficiencies have been studied with releases of marked hatchery fish, these data may not be adequate to estimate the total number of migrants with confidence. Unanswered questions and problems include: 1) the results of replicate calibration tests are quite variable and partially depend on the size of the release groups of hatchery fish; 2) whether calibration tests with hatchery fish reflect the trap's capture efficiency with wild fish; 3) whether wild fish migrate during the day when screw trapping is totally ineffective; and 4) low capture rates at high flows. If a suitable monitoring site can be located, then it may be possible to resolve these issues and ensure that the estimates of juvenile migrants are accurate.

PROJECT DESCRIPTION: This project would be conducted in two phases. The first phase would require a two week effort in late March to determine whether hydraulically suitable sites for hydroacoustic monitoring exist near the Oakdale and Caswell Parks screw trap sites. If suitable sites are located during Phase I, then Phase II would be initiated to compare hydroacoustic counts with calibrated screw trap estimates at two flows, the base flow and pulse flow releases between April 1st through April 30th. The Phase II report would discuss whether the screw trap estimates are adequate, and if not, whether combined hydroacoustic counts and screw trapping would solve the problems.

ESTIMATED COST: Phase I costs are $35,000. Phase II costs are $160,000.

STATUS: This project could be implemented in 1998.

PROJECT PROPONENTS: The Stockton East Water District.

PROJECT TITLE: GOODWIN CANYON GRAVEL REPLENISHMENT MONITORING (#50)

LOCATION: Stanislaus River upstream of Knights Ferry downstream of Goodwin Dam.

BENEFITS: To monitor the stability, movement, and salmonid use of augmented spawning gravel.

PROJECT DESCRIPTION: The gravel and salmonid use will be monitored for three years due to the expected effects of gravel seasoning and grade adjustments of the augmented gravel.

Task 1. Physically Describe and Monitor Gravel Augmentation Sites. Map each of the four gravel augmentation locations for relative elevation and substrate composition (pebble counts) from above the head to below the toe of each study riffle. Verticals will not be more than two feet apart on each cross-section, cross sections located every 20 feet. One elevation map for each riffle will be developed prior to gravel augmentation and will represent baseline conditions. Mapping will be repeated soon after the initial spreader flow occurs and annually thereafter. Each of the surveys will be compared with one another to document elevational changes (fill or scour) within gravel augmented reaches. Elevational changes will be correlated with streamflow.

Task 2. Use of natural riffles as a control. Bedload transport rate and spawning activity rate will be monitored at nearby natural riffles for comparison with the augmented areas.

Task 3. Ensure that tracer gravels are not biased. Tracer gravels should move at the same rates as the imported gravel, otherwise they are not useful as tracers. The specific gravity, shape, and proportion of grain sizes will be compared between the tracer gravels and the rest of the imported gravel. It is necessary to perform this task only once.

Task 4. Assess potential rate of gravel transport and depositional areas in the study reach. Before spreader flows occur, habitat map Goodwin Canyon from upstream of the highest experimental site to Two Mile Bar in terms of gradient, channel confinement, and streambed roughness. Pools between the gravel augmentation sites and Two Mile Bar will be profiled.

Task 5. Monitor Gravel Movement. The area downstream of the experimental sites to Two Mile Bar will be searched annually for tracer gravels. The location of tracer gravels will be documented on a base map and the volume of new gravel deposited at each site will be estimated.

Task 6. Comparison of Native and Exotic Gravel. The augmented gravel will be compared to the native gravel in terms of size composition, fraction cracked, and angularity.

Task 7. Monitor Salmon Use Each Year. Salmon spawning use will be monitored at 10-day intervals from late-October through December. To monitor intragravel water quality, piezometers and thermographs will be buried in two artificial redds (no eggs) at the top and bottom of each site. Indices of downwelling of surface water will include vertical hydraulic gradient and the difference in temperature between surface and intragravel water. Vertical hydraulic gradient and intragravel dissolved oxygen concentrations will be measured at each piezometer at 10-day intervals from October 20 through December 31 and on January 31. Surface and intragravel water temperatures will be monitored with thermographs recording at 30-minute intervals between October 20 to January 31.

ESTIMATED COST: $70,000 the first year and $60,000 each year thereafter.

STATUS: This project could be implemented in 1997.

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PROJECT TITLE: MONITORING THE CHANNEL RESTORATION SITE AT THE OAKDALE RECREATION AREA, STANISLAUS RIVER (#51)

LOCATION: Captured Mine Pit adjacent to the Oakdale Recreation Area.

BENEFITS: Channel alterations from gravel mining in the Stanislaus River channel has created pond-like habitat within the river. It is thought that bedload transport is interrupted, stream waters are warmed, and predators such as largemouth bass, smallmouth bass, striped bass and Sacramento squawfish inhabit these sections in higher densities than the stream-like portions of the Stanislaus River and prey upon salmon juveniles at higher rates than at other parts of the river.

PROJECT DESCRIPTION: The restoration site will be monitored for three years.

Task 1. Document Habitat Changes. Quantity and quality of chinook salmon habitat will be evaluated with annual aquatic habitat delineation surveys. Stream length, aquatic habitat types, bank stability, shaded riverine aquatic cover, riparian continuity and depth, pool residual volume index, spawning habitat quality, rearing habitat quality, substrate composition, aquatic invertebrate quality, and instream cover will be assessed within each habitat. An air photo base map will be developed to be used as a reference for all tasks.

Task 2. Describe Annual Changes in Streambed Elevation. The restored section may have upstream and downstream influences, and a longitudinal elevation profile will be developed from about 2,500 feet above the restored section, through the restored section, and 2,500 feet downstream of the restored section. If as-builts survey data are not available, an elevation map will be developed by establishing, monumenting, and measuring a series of cross-sections with an electronic total station. Substrate composition will also be assessed with pebble counts.

Task 3. Monitor Bedload Transport Annually. Restoring the stream channel should restore sediment transport within these reaches. Bedload transport will be evaluated using flow records, comparisons of elevational maps and aerial photographs, video and photographs taken each year, bulk bed samples taken upstream, within, and downstream of the restored section, and pebble counts taken on newly formed bars.

Task 4. Monitor Water Temperatures. The removal of pond-like habitat will reduce residence time of water traveling through the restored reach. Water temperature loggers will monitor stream water temperatures at hourly intervals immediately upstream, within, and immediately downstream of the restored reaches, before and after restoration.

Task 5. Determine Predator Densities. Prior to restoration, the ponded area will be sampled to determine predator density. A nearby area with a similar gradient to the designed gradient of the restored area will also be sampled and will serve as a control. After the project area is restored, the predator densities will be resampled within the control and restored areas. Predator stomachs will be pumped to document level of predation on salmon juveniles.

Task 6. Document spawning activity within the reconstructed sections. Salmon spawning use will be monitored at 10-day intervals from late-October through December. To monitor intragravel water quality, piezometers and thermographs will be buried in two artificial redds (no eggs) at the top and bottom of each reconstructed riffle. Indices of downwelling of surface water will include vertical hydraulic gradient and the difference in temperature between surface and intragravel water. Vertical hydraulic gradient and intragravel dissolved oxygen concentrations will be measured at each piezometer at 10-day intervals from October 20 through December 31 and on January 31. Surface and intragravel water temperatures will be monitored with thermographs recording at 30-minute intervals between October 20 and January 31.

ESTIMATED COST: $100,000 the first year and $90,000 each year thereafter.

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PROJECT TITLE: MONITORING THE WILLMS CHANNEL RESTORATION PROJECT (#52)

LOCATION: Stanislaus River downstream of Knights Ferry near Lovers Leap Recreation Area.

BENEFITS: Channel alterations from gravel mining in the Stanislaus River channel has created pond-like habitat within the river. It is thought that bedload transport is interrupted, stream waters are warmed, and predators such as largemouth bass, smallmouth bass, striped bass and Sacramento squawfish inhabit these sections in higher densities than the stream-like portions of the Stanislaus River and prey upon salmon juveniles at higher rates than at other parts of the river.

PROJECT DESCRIPTION: The restoration site will be monitored for three years.

Task 1. Document Habitat Changes. Quantity and quality of chinook salmon habitat will be evaluated with annual aquatic habitat delineation surveys. Stream length, aquatic habitat types, bank stability, shaded riverine aquatic cover, riparian continuity and depth, pool residual volume index, spawning habitat quality, rearing habitat quality, substrate composition, aquatic invertebrate quality, and instream cover will be assessed within each habitat. An air photo base map will be developed to be used as a reference for all tasks.

Task 2. Describe Annual Changes in Streambed Elevation. The restored section may have upstream and downstream influences, and a longitudinal elevation profile will be developed from about 2,500 feet above the restored section, through the restored section, and 2,500 feet downstream of the restored section. If as-builts survey data are not available, an elevation map will be developed by establishing, monumenting, and measuring a series of cross-sections with an electronic total station. Substrate composition will also be assessed with pebble counts.

Task 3. Monitor Bedload Transport Annually. Restoring the stream channel should restore sediment transport within these reaches. Bedload transport will be evaluated using flow records, comparisons of elevational maps and aerial photographs, video and photographs taken each year, bulk bed samples taken upstream, within, and downstream of the restored section, and pebble counts taken on newly formed bars.

Task 4. Monitor Water Temperatures. The removal of pond-like habitat will reduce residence time of water traveling through the restored reach. Water temperature loggers will monitor stream water temperatures at hourly intervals immediately upstream, within, and immediately downstream of the restored reaches, before and after restoration.

Task 5. Determine Predator Densities. Prior to restoration, the ponded area will be sampled to determine predator density. A nearby area with a similar gradient to the designed gradient of the restored area will also be sampled and will serve as a control. After the project area is restored, the predator densities will be resampled within the control and restored areas. Predator stomachs will be pumped to document level of predation on salmon juveniles.

Task 6. Document spawning activity within the reconstructed sections. Salmon spawning use will be monitored at 10-day intervals from late-October through December. To monitor intragravel water quality, piezometers and thermographs will be buried in two artificial redds (no eggs) at the top and bottom of each reconstructed riffle. Indices of downwelling of surface water will include vertical hydraulic gradient and the difference in temperature between surface and intragravel water. Vertical hydraulic gradient and intragravel dissolved oxygen concentrations will be measured at each piezometer at 10-day intervals from October 20 through December 31 and on January 31. Surface and intragravel water temperatures will be monitored with thermographs recording at 30-minute intervals between October 20 and January 31.

ESTIMATED COST: $90,000 the first year and $80,000 each year thereafter.

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PROJECT TITLE: FLOODWAY AND LEVEE RECONSTRUCTION, TUOLUMNE RIVER NEAR WATERFORD (#53)

PROJECT LOCATION: Tuolumne River, from downstream extent of Santa Fe Aggregates (river mile 35.7) to upstream extent of 7/11 Aggregates (river mile 39.0), approximately 22 miles east of Modesto.

PROBLEM ADDRESSED: The relocation of aggregate extraction operations on the Tuolumne River from instream sources to pre-dam floodplains and terraces has resulted in off-channel pits separated from the river by small levees. In many cases, these levees were constructed to contain a maximum instream flow less than 9,000 cfs. In January 1997, flows exceeding 50,000 cfs breached most levees, connecting the ponds to the river in most locations. Additionally, nearly complete river capture occurred in a series of pits from river mile 37.5 to 38.4. Significant stranding may occur as the river recedes during the salmonid out-migration period.

PROJECT DESCRIPTION: Both aggregate operators in this reach will need to repair these levees as soon as the water recedes. Rather than rebuild the levees to the same inadequate capacity (and ecologically incorrect) as prior to the 1997 flood, we propose to redefine the floodway through this reach wide enough to safely convey the 50 year flood. Because the operators need to repair the levees anyway, cost-sharing now to pay for the additional cost of pulling the levees back, increasing floodway capacity, restoring a functional floodplain through the reach, and revegetating these floodplains is the most cost-effective means for developing a long-term floodway solution for this 3.3 mile reach of the Tuolumne River.

BENEFITS: Floodway capacity will be increased to adequately convey future floods up to a 50 year flood event. The reduction/prevention of levee failure will reduce the risk of river capture in off-channel aggregate extraction pits. Benefits include: 1) reduced salmonid stranding, 2) reduced future restoration/maintenance costs for both public funding sources and the aggregate operators, 3) potentially reduced flood downstream from floodplain storage, 4) increased riparian habitats, 5) increased diversity of salmonid habitats within the floodway, and 5) increased ability of the river channel to adjust its morphology without damaging human structures. Salmonid spawning and rearing can and does occur in this reach, but restoring the floodway width will both increase the quantity and quality of salmonid habitats through this reach.

ESTIMATED COSTS: Costs have not yet been estimated. Site topography data are currently being collected, and cost-estimates will be provided after these data have been reduced and cost sharing negotiations have taken place.

STATUS: Both aggregate operators have been contacted and expressed willingness to participate in cost-sharing. Channel and pond topography is currently being collected upon which cost estimates can be made. Negotiations for cost-sharing percentages has not yet commenced.

PROJECT PROPONENT: Santa Fe Aggregates, 7/11 Aggregates, and Tuolumne River Technical Advisory Committee (Don Pedro Project, FERC License No. 2299, participants include: Bay Area Water Users Association, California Department of Fish and Game, City and County of San Francisco, Friends of the Tuolumne Trust, Modesto Irrigation District, Tuolumne River Preservation Trust, Turlock Irrigation District, US Fish and Wildlife Service).